

**From:** Whittaker, Laura [laura.whittaker@aptim.com]  
**Sent:** Monday, July 23, 2018 1:35 PM  
**To:** Liscio, Matthew P CIV SEA 04, NAVSEA DET RASO [matthew.liscio@navy.mil]  
**CC:** Slack, Matthew L CIV SEA 04 04N [matthew.slack@navy.mil]; Howard, Leslie A CIV NAVFAC SW [leslie.howard@navy.mil]; Noble, Kimberly K CIV SEA 04, NAVSEA DET RASO [kimberly.k.noble1@navy.mil]; Johnson, Nels [Nels.Johnson@aptim.com]; Schul, Raymond [raymond.schul@aptim.com]; Guillory, Jeffrey [jeffrey.guillory@aptim.com]; Meldrum, Amy [amy.meldrum@aptim.com]; Hanelt, Norm [Norm.Hanelt@aptim.com]; Killpack, Randall [randall.killpack@aptim.com]; Gerg, David [david.erg@aptim.com]; Chi, Minhsec [minhsec.chi@aptim.com]; Orman, Sean [sean.orman@aptim.com]; Rogers, Bryon [bryon.rogers@aptim.com]  
**Subject:** [Non-DoD Source] Data package ready for review - HPNS PE-2, RSY C5 (Use 8)  
**Attachments:** HPNS APTIM RSY C5 (Use 8) Soil Non-LLRW Concurrence Request 07242018 (reduced).pdf

Mr. Liscio,

APTIM request RASO concurrence to designate this soil as Non-LLRW soil.

If there are any questions or if additional data is required, please contact me.

Thank you.



Laura Whittaker  
Senior Radiation Control Technician 4, Radiation Safety  
Cell: +423 544 9145  
[Laura.Whittaker@aptim.com](mailto:Laura.Whittaker@aptim.com)

APTIM  
Hunters Point Naval Shipyard  
200 Fisher Avenue  
San Francisco, CA 94124



## Hunters Point Naval Shipyard, Parcel E-2 RSY Data Report

### Contract No. EMAC III CTO-0013

RSY Pad: C5	RSY Pad Use Number: USE 8	First Submittal <input checked="" type="checkbox"/> Second Submittal <input type="checkbox"/>	
Data attached and submitted by: Laura Whittaker	Data Report Submittal Date: 07/24/2018		

### Soil Sample Data

Sample Identification	Survey Location	Type of Sample	<sup>226</sup> Ra Final Analytical Results (pCi/g)	<sup>137</sup> Cs Final Analytical Results (pCi/g)	<sup>60</sup> Co Final Analytical Results (pCi/g)	Total Sr Final Analytical Results (pCi/g)
		Upper limit of site reference background	1.633	0.113	0.252	0.331
PE2-RSYC5-USE8-S001	1	Systematic	0.641	-0.0213	0.00504	0.00455
PE2-RSYC5-USE8-S002	2	Systematic	0.785	0.0286	0.0165	N/A
PE2-RSYC5-USE8-S003	3	Systematic	0.555	-0.0579	-0.0825	N/A
PE2-RSYC5-USE8-S004	4	Systematic	0.510	0.0271	0.00613	N/A
PE2-RSYC5-USE8-S005	5	Systematic	0.642	0.0407	-0.0569	N/A
PE2-RSYC5-USE8-S006	6	Systematic	0.583	0.0229	0.00864	N/A
PE2-RSYC5-USE8-S007	7	Systematic	0.715	-0.0419	-0.0014	N/A
PE2-RSYC5-USE8-S008	8	Systematic	0.751	0.00538	0.0405	N/A
PE2-RSYC5-USE8-S009	9	Systematic	0.588	0.0348	-0.00509	N/A
PE2-RSYC5-USE8-S010	10	Systematic	0.738	0.0220	0.0103	N/A
PE2-RSYC5-USE8-S011	11	Systematic	2.70	-0.1160	0.0165	0.118
PE2-RSYC5-USE8-S012	12	Systematic	0.474	0.0285	-0.00149	N/A
PE2-RSYC5-USE8-S013	13	Systematic	0.526	0.0509	0.0384	N/A
PE2-RSYC5-USE8-S014	14	Systematic	0.535	-0.0544	0.0132	N/A
PE2-RSYC5-USE8-S015	15	Systematic	0.535	-0.0132	0.00182	N/A
PE2-RSYC5-USE8-S016	16	Systematic	0.730	0.0326	-0.0414	N/A
PE2-RSYC5-USE8-S017	17	Systematic	0.740	-0.0689	-0.00639	N/A
PE2-RSYC5-USE8-S018	18	Systematic	0.573	0.0454	0.0292	N/A
<b>Bounding Soil Sample Data (following over-excavation of PE2-RSYC5-U8-S011)</b>						
PE2-RSYC5-U8-B-S011-BOUNDING-01	1	Bounding	0.704	-0.0259	0.0350	N/A
PE2-RSYC5-U8-B-S011-BOUNDING-02	2	Bounding	0.720	0.00794	-0.0732	N/A
PE2-RSYC5-U8-B-S011-BOUNDING-03	3	Bounding	1.04	-0.0329	0.0551	N/A
PE2-RSYC5-U8-B-S011-BOUNDING-04	4	Bounding	0.878	0.0423	0.0044	N/A

<sup>137</sup>Cs Cesium-137<sup>60</sup>Co Cobalt-60<sup>226</sup>Ra Radium-226

Sr Strontium

pCi/g Picocuries per gram

Sample exceeded project action limits. –see 4) in the Summary table (page 2) for more details.

### Instrument and Survey Data

Activity	Survey #	Date	Meter	Calibration Due Date	Serial #	Reference Area Static Bkgd	Reference Area Static 3σ IL	Reference Area Scan Bkgd	Reference Area Scan 3σ IL	Range
RSI Gamma Walkover Survey	HPRS-03102018-PE2-ROV2-1890	03/10/2018	RS-701/RSX-1	N/A	Console: 7236 Detectors: 5447,5448	N/A	N/A	3,290 CPS	4,473 CPS	3,112-3,887 CPS
RSI Follow-up Static Survey	HPRS-03192018-PE2-JSS1-1931	03/19/2018	RS-701/RSX-1	N/A	Console: 6006 Detectors: 5597,5678	3,834 CPS	4,270 CPS	N/A	N/A	3,375-3,745 CPS
Systematic Sample Survey	HPRS-03102018-PE2-JSS-1887	03/10/2018	2221	02/09/2019	105934	15,147 CPM	17,406 CPM	N/A	N/A	14,503-15,921 CPM
Bounding Sample Survey	HPRS-06082018-PE2-JSS-2563	06/08/2018	2221	07/12/2018	271439	15,783 CPM	18,714 CPM	N/A	N/A	14,623-15,186 CPM

3σ IL Investigation Level (established at 3σ above the mean of the Reference Area dataset)

CPS Counts per second

CPM Counts per minute

Summary
1) RSI gamma walkover survey and data review—upon review of initial scan data, follow-up static investigations were deemed necessary, and investigation locations were identified as per the RSI Data Evaluation Process (pages 3-4). Gamma scan coverage is shown on the Systematic Sample Survey map (page 8). Contour maps of scan data are shown on RSI Data Plots (page 5). Data review results are summarized on RSI Review Summary (page 6).
2) RSI Follow-up static survey—23 locations identified during the data review process were investigated, with readings less than the Reference Area static IL at all locations for regions of interest (ROIs) 3, 6, 7, 8, and 9 (VD1). Follow-up locations are shown on the RSI Follow-up Static Survey map (page 7).
3) Eighteen systematic soil samples (001-018) were obtained and submitted for gamma spectroscopy analysis. Sample locations for systematic samples are shown on the Systematic Sample Survey map (page 8). TestAmerica sample results are attached (pages 33-59).  Ten percent of the systematic soil samples (two samples in total, PE2-RSYC5-USE8-S001 & PE2-RSYC5-USE8-S011) were also analyzed for total strontium. Total Strontium results are also included in the TestAmerica sample results report (pages 33-59).  <u>Note:</u> Radium-226 results included in the TestAmerica samples results report (pages 33-59) exceed project action limits for sample PE2-RSYC5-U8-S011. Following receipt of the elevated sample results, a 2'x2' area was demarcated in the soil surrounding the sample location, and all RSY material within the demarcated area was over-excavated and controlled as Low-Level Radiological Waste (LLRW). Bounding samples were collected at the edges of the 2'x2' over-excavation area for gamma spectroscopy analysis to additionally support the RSY material in its final configuration—see 4) below.
4) Bounding Sample Survey—samples PE2-RSYC5-U8-S011-BOUNDING-01 through PE2-RSYC5-U8-S011-BOUNDING-04 were collected from the edges of the 2'x2' over-excavation area surrounding systematic sample PE2-RSYC5-U8-S011 and submitted for gamma spectroscopy analysis. Bounding soil sample locations and the over excavation area are shown on the Bounding Sample Survey map (page 9). TestAmerica sample results are attached (pages 60-73).  <u>Note:</u> All RSY material within the demarcated over-excavation area surrounding systematic sample PE2-RSYC5-U8-S011 was removed and controlled as LLRW. Gamma spectroscopy analysis results for bounding samples collected at the edges of the over-excavation are within project action limits and included in the statistical characterization of the RSY pad.
<b>Conclusions:</b>  All locations with elevated Z-scores identified by the RSI gamma walkover survey were determined to be consistent with background. 23 locations were investigated during the follow-up static survey, with readings less than the Reference Area static IL at all locations for ROIs 3, 6, 7, 8, and 9 (VD1). Spectral analysis results and gamma static data for each region of interest (ROI) are provided (pages 10-32).  Final analytical results for systematic and bounding samples from this RSY pad (in its final configuration) are concluded to be comparable to background. Histograms showing soil sample activity concentrations are provided (pages 33-35). Ten percent of the systematic soil samples (two samples in total, PE2-RSYC5-USE8-S001 & PE2-RSYC5-USE8-S011) were also analyzed for total strontium, with concentrations less than the Project Action Limit of 0.331 pCi/g, as shown in the Soil Sample Data table (page 1).  RSY C5 (Use 8) contains soil from the Shoreline Survey Unit 11 and the Tidal Wetlands Survey Unit 01 excavation areas (SH-11 & TW-01).  APTIM request RASO concurrence to release this soil as Non-LLRW. <b>Disposition:</b> This soil shall be dispositioned as non-LLRW waste to be stockpiled onsite following appropriate chemical characterization.

## RSI Data Evaluation Process

### RS-700 Mobile Radiation Monitoring System

- Self-contained gamma-ray radiation detection and monitoring system
- (2) RSX-1 4-liter NaI(Tl) gamma detectors oriented perpendicular to the direction of travel (VD1 denotes both detectors summed; VD3 refers to the left detector; and VD4 refers to the right detector)
- Multi-Channel Analyzer, allowing for monitoring of energy-specific regions of interest (ROIs)
- RadAssist survey software for control, monitoring, and recording

Ten ROIs have been established for radium and progeny, cesium, and cobalt, as well as other naturally-occurring or anthropogenic gamma-emitting radionuclides that may be of interest:

ROI	Description	Energy Range (keV)	Primary Peak (keV)
1	Total counts	411 – 2811	N/A
2	Potassium	1371 – 1569	1460
3	U/Ra-226	1659 – 1860	1764 (Bi-214)
4	Thorium	2409 – 2811	2614 (Tl-208)
5	Annihilation	456 – 570	511
6	Ra-226	546 – 666	609 (Bi-214)
7	Cs-137	600 - 720	662
8	Pb-214/Ra-226	327 – 399	351
9	Co-60	1085 - 1370	1173/1332
10	Gross Counts	24 – 2811	N/A

A tiered approach is used during data review to identify follow-up locations. Raw data are exported to a comma delimited format using RadAssist and imported into an Excel spreadsheet for review and analysis. The following review steps are completed to determine if additional follow-up measurements are necessary:

- **Playback Review:** The data file is replayed in RadAssist and reviewed for elevated count rates in ROIs 6, 7, 9, and 10 for virtual detector (VD) 1 (both detectors summed). The scan screen is also monitored for elevated count rates and alarms.
- **Count Rate Time Series Review:** The count rates for ROIs 6, 7, 9, and 10 for VDs 1, 3 (detector 1), and 4 (detector 2) are plotted in a time series and reviewed for additional peaks in count rate.
- **All ROIs:**
  - **Z-Scores:** The Z-Scores are calculated for each location in all ROIs for VDs 1, 3, and 4. Any location with four or more ROIs having a Z-Score greater than three ( $Z>3$ ) is marked for follow-up.
  - **Local Z-Scores:** Local Z-Scores are calculated using a moving average for each data point in all ROIs for VDs 1, 3, and 4 to identify elevated count rates where the background is variable (e.g. multiple surface types). Any location (in a survey unit that meets this condition) with four or more ROIs having a local  $Z>3$  is marked for follow-up.
  - **Semi-local Z-Scores:** Semi-local Z-Scores are calculated using the global average, but with a moving average for the standard deviation for VDs 1, 3, and 4. This is used for survey data that have a consistent background but an area or areas of highly elevated count rates, in order to identify smaller areas of elevated count rates that may not otherwise be identified by the initial Z-score review. Any location (in a survey unit that meets this condition) with four or more ROIs having a semi-local  $Z>3$  is marked for follow-up.
- **ROIs 3, 6, 8, and 10 (radium-specific ROIs):**
  - Z-Scores: The Z-Scores are calculated for each location in the radium-specific ROIs for VDs 1, 3, and 4. Any location with three or more radium-specific ROIs having a  $Z>3$  is marked for follow-up.
  - Local Z-Scores: Local Z-Scores are calculated using a moving average for each data point in the radium-specific ROIs for VDs 1, 3, and 4 to identify elevated count rates where the background is variable (e.g. multiple surface types). Any location (in a survey unit that meets this condition) with three or more radium-specific ROIs having a local  $Z>3$  is marked for follow-up.
  - Semi-local Z-Scores: Semi-local Z-Scores are calculated using the global average, but with a moving average for the standard deviation for VDs 1, 3, and 4. This is used for survey data that have a consistent background but an area or areas of highly elevated count rates, in order to identify smaller areas of elevated count rates that may not otherwise

be identified by the initial Z-score review. Any location (in a survey unit that meets this condition) with three or more radium-specific ROIs having a semi-local  $Z > 3$  is marked for follow-up.

- **ROI 7 (cesium-specific ROI):**
  - Z-Scores: Z-Scores are calculated for each location in ROI 7 for VDs 1, 3, and 4. Any location having a  $Z > 3$  is marked for follow-up.
  - Local Z-Scores: Local Z-Scores are calculated using a moving average for each data point in ROI 7 for VDs 1, 3, and 4 to identify elevated count rates where the background is variable (e.g. multiple surface types). Any location (in a survey unit that meets this condition) having a local  $Z > 3$  is marked for follow-up.
  - Semi-local Z-Scores: Semi-local Z-Scores are calculated using the global average, but with a moving average for the standard deviation in ROI 7 for VDs 1, 3, and 4. This is used for survey data that have a consistent background but an area or areas of highly elevated count rates, in order to identify smaller areas of elevated count rates that may not otherwise be identified by the initial Z-score review. Any location (in a survey unit that meets this condition) having a semi-local  $Z > 3$  is marked for follow-up.
- **ROI 9 (cobalt-specific ROI):**
  - Z-Scores: Z-Scores are calculated for each location in ROI 9 for VDs 1, 3, and 4. Any location having a  $Z > 3$  is marked for follow-up.
  - Local Z-Scores: Local Z-Scores are calculated using a moving average for each data point in ROI 9 for VDs 1, 3, and 4 to identify elevated count rates where the background is variable (e.g. multiple surface types). Any location (in a survey unit that meets this condition) having a local  $Z > 3$  is marked for follow-up.
  - Semi-local Z-Scores: Semi-local Z-Scores are calculated using the global average, but with a moving average for the standard deviation in ROI 9 for VDs 1, 3, and 4. This is used for survey data that have a consistent background but an area or areas of highly elevated count rates, in order to identify smaller areas of elevated count rates that may not otherwise be identified by the initial Z-score review. Any location (in a survey unit that meets this condition) having a semi-local  $Z > 3$  is marked for follow-up.
- **Z-Score Time Series Review:** The three types of Z-Scores for ROIs 6, 7, 9, and 10 for VDs 1, 3, and 4 are plotted in a time series and reviewed for additional peaks in Z-Scores.

Any location selected for follow-up or with a Z-Score  $> 3$  in a radium-, cesium-, or cobalt-specific ROI will undergo spectral analysis to determine if it is statistically likely that there are ROC concentrations present at that location in quantities greater than background.

A background spectrum is subtracted from the local spectral data for a given location, and the resulting net spectrum is plotted. Critical levels, as defined in Section 6.7.1 of the Multi Agency Radiation Survey and Site Investigation Manual are calculated and plotted based on background levels. The critical level is the level, in counts, at which there is a statistical probability (with a predetermined confidence) of incorrectly identifying a measurement system background value as greater than background. Any response above this level is considered to be greater than background. The critical level is calculated for ROIs 6, 7, 8, and 9 according to the equation shown below:

Where:

$$L_C = 2.33\sqrt{B}$$

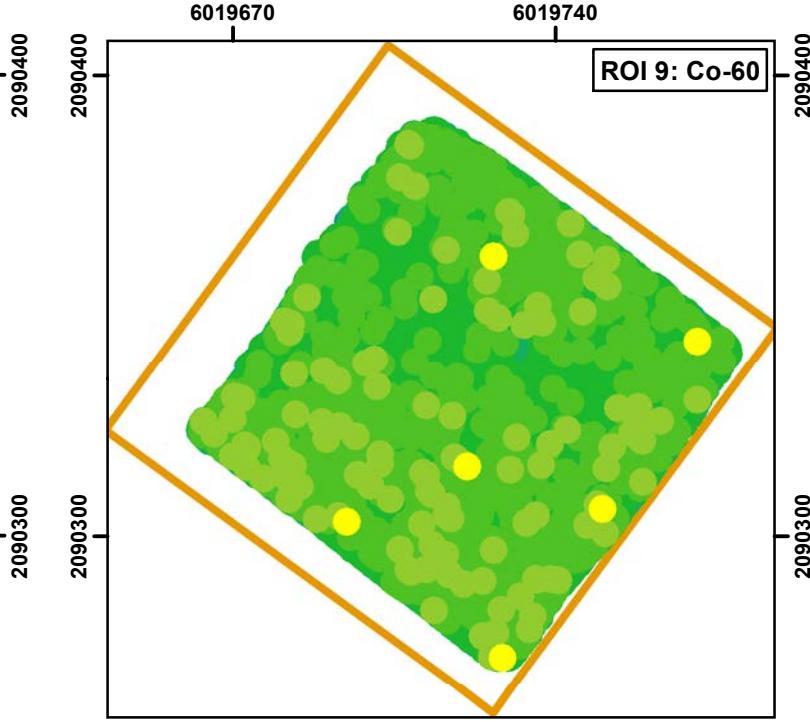
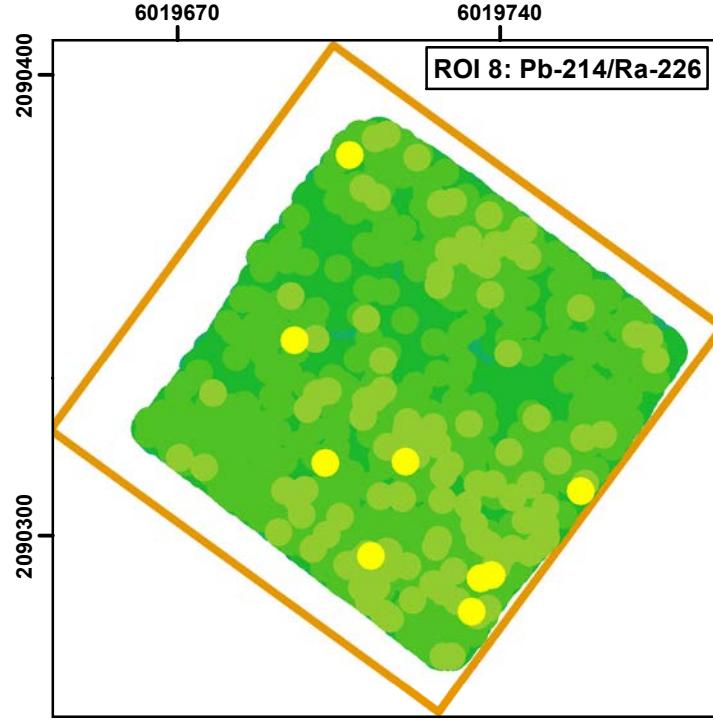
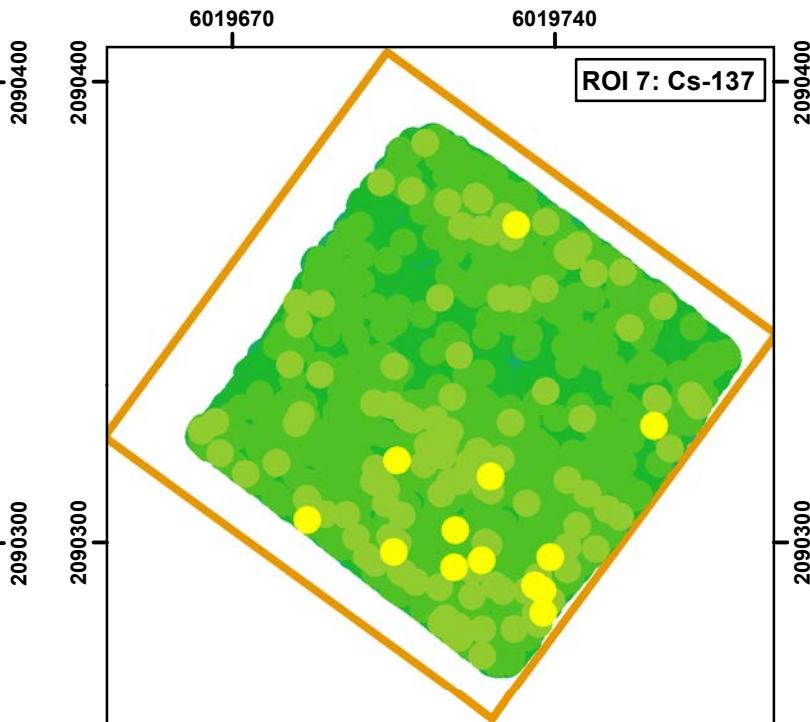
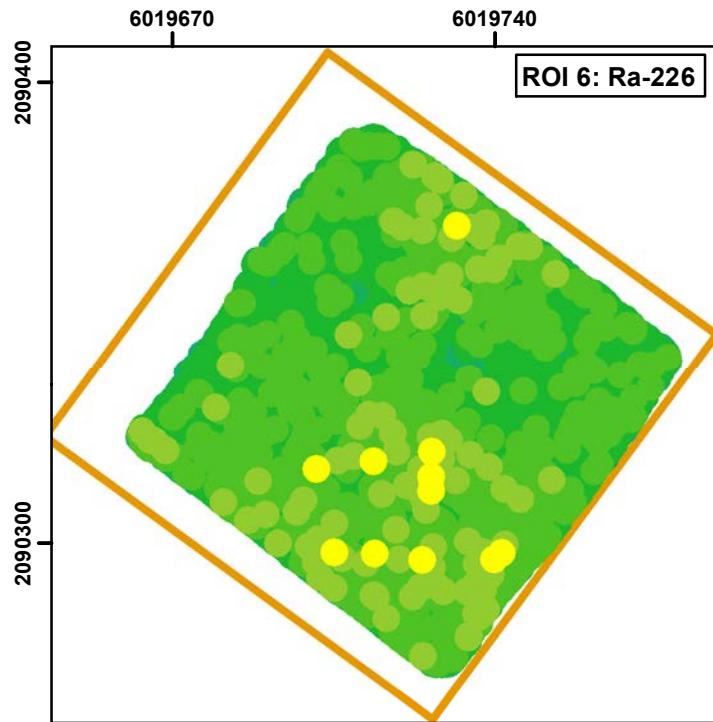
LC	=	critical level (counts)
B	=	average background in the ROI

When count rates in the net gamma spectrum at a given location do not exceed critical levels for any radium-, cesium-, or cobalt-specific energy ranges, it is unlikely that ROC concentrations exist at that location above background.

Any data point that is both above the critical level and within the energy range of a given ROI is considered above background for that radionuclide and will be flagged for further investigation in the field.

# HPNS Parcel E-2 RSY Pad C5 (Use 8)

Contour Map

Soil Excavation Site:  
SH-11 & TW-01**RS-700 Gamma Walkover Data (VD1)**

- |  |                                   |
|--|-----------------------------------|
| Yellow circle: > 3 std dev             | Green circle: > -1 to < 0 std dev |
| Light green circle: > 2 to < 3 std dev | Cyan circle: > -2 to < -1 std dev |
| Dark green circle: > 1 to < 2 std dev  | Blue circle: > -3 to < -2 std dev |
| Dark green circle: > 0 to < 1 std dev  | Dark blue circle: < -3 std dev    |
- RSY Pad Boundaries**

0    15    30    60    Feet

Coordinate system: CSP Zone III, NAD83, US Survey Foot



## RSI Review Summary

### **Summary:**

23 locations were initially selected for follow-up investigation. Locations were identified by elevated peaks noted in the playback review and/or time series charts, and by using the Z-Score, Local Z-Score, and Semi-Local Z-Score reviews as described in the RSI Data Evaluation Process on pages 3-4. Spectral analyses performed on gamma static data at these locations do not indicate the presence of  $^{226}\text{Ra}$ ,  $^{137}\text{Cs}$ , or  $^{60}\text{Co}$  above background. Gamma static readings at these locations are less than the Reference Area static IL for ROIs 3, 6, 7, 8, and 9; figures are provided on pages 9-31.

**HPNS Parcel E-2**  
**RSY Pad C5 (Use 8)**

Soil Excavation Site:  
SH-11 & TW-01

6019670

6019740

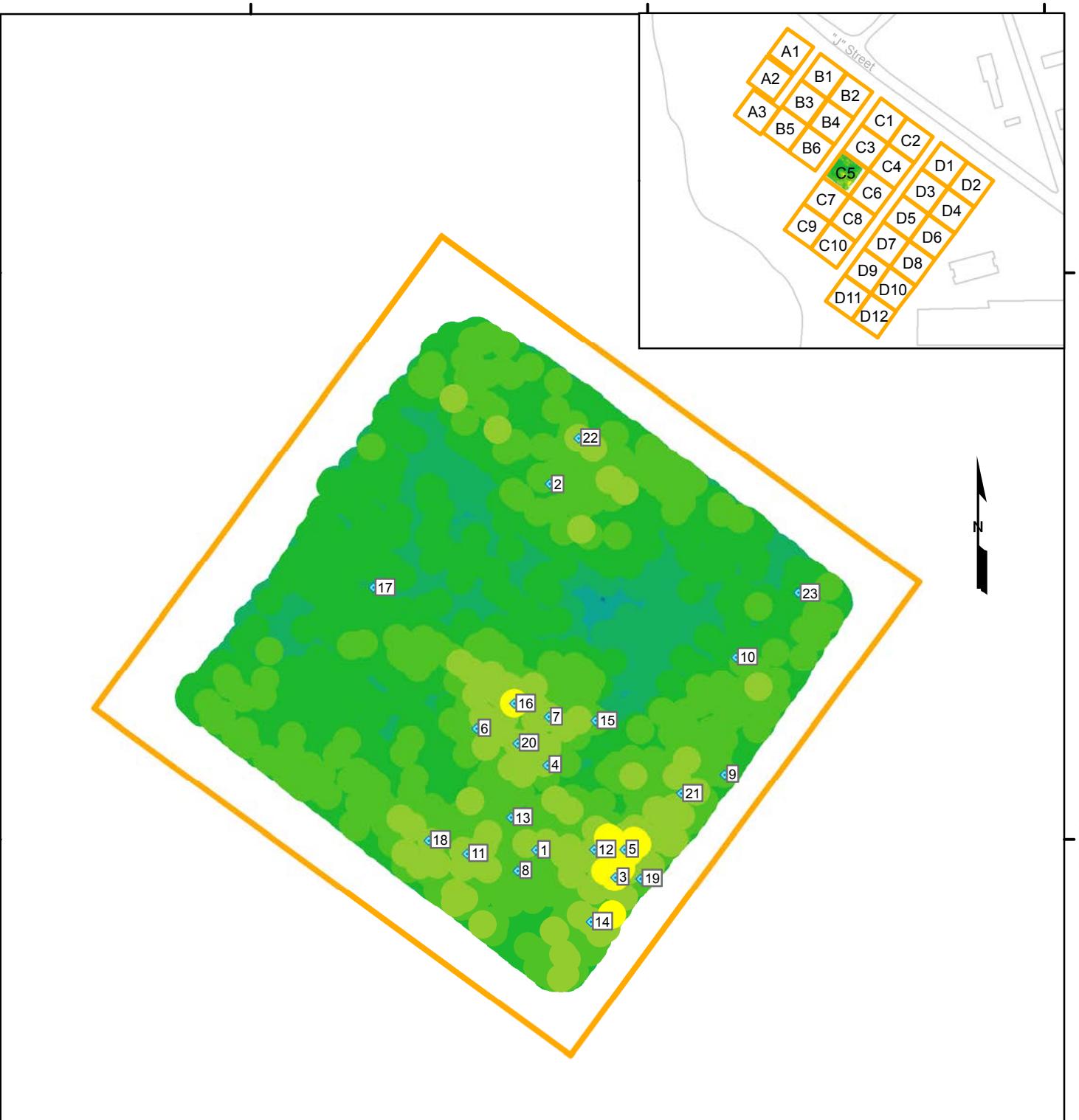
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2090300

2090300



Systematic Sample Survey  
HPRS-03102018-PE2-JSS-1887

## HPNS Parcel E-2 RSY Pad C5 (Use 8)

Soil Excavation Site:  
SH-11 & TW-01

6019670

6019740

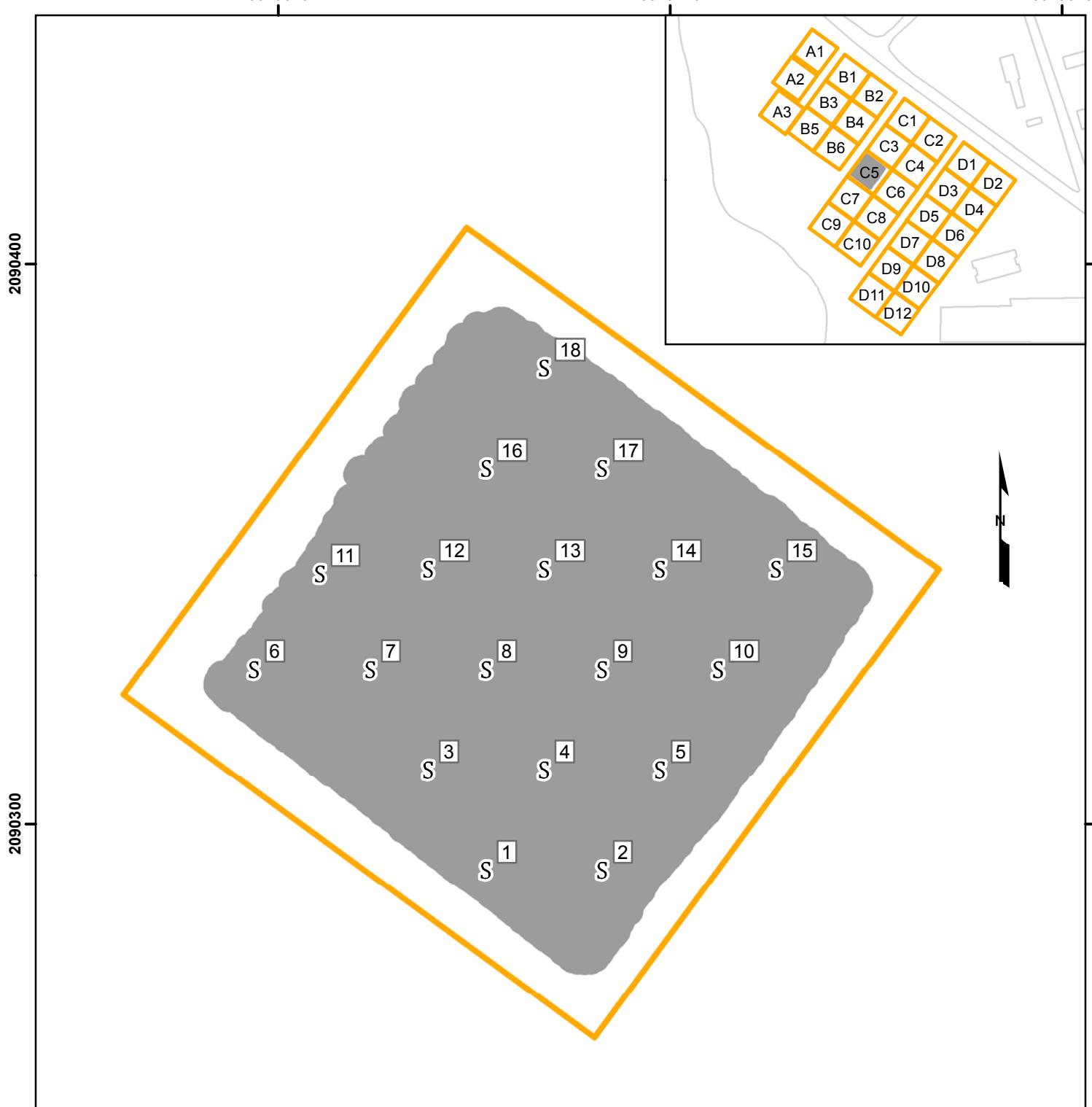
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**Survey Instrument: Model 2221/ 44-20**  
**Serial Number: 105934**

- S Systematic Sample Locations
- RS-700 GWS Scan Coverage
- RSY Pad Boundaries

Coordinate system: CSP Zone III, NAD83, US Survey Foot

0 10 20 40  
Feet



Bounding Sample Survey  
HPRS-06082018-PE2-JSS-2563

## HPNS Parcel E-2 RSY Pad C5 (Use 8)

Soil Excavation Site:  
SH-11 & TW-01

6019670

6019740

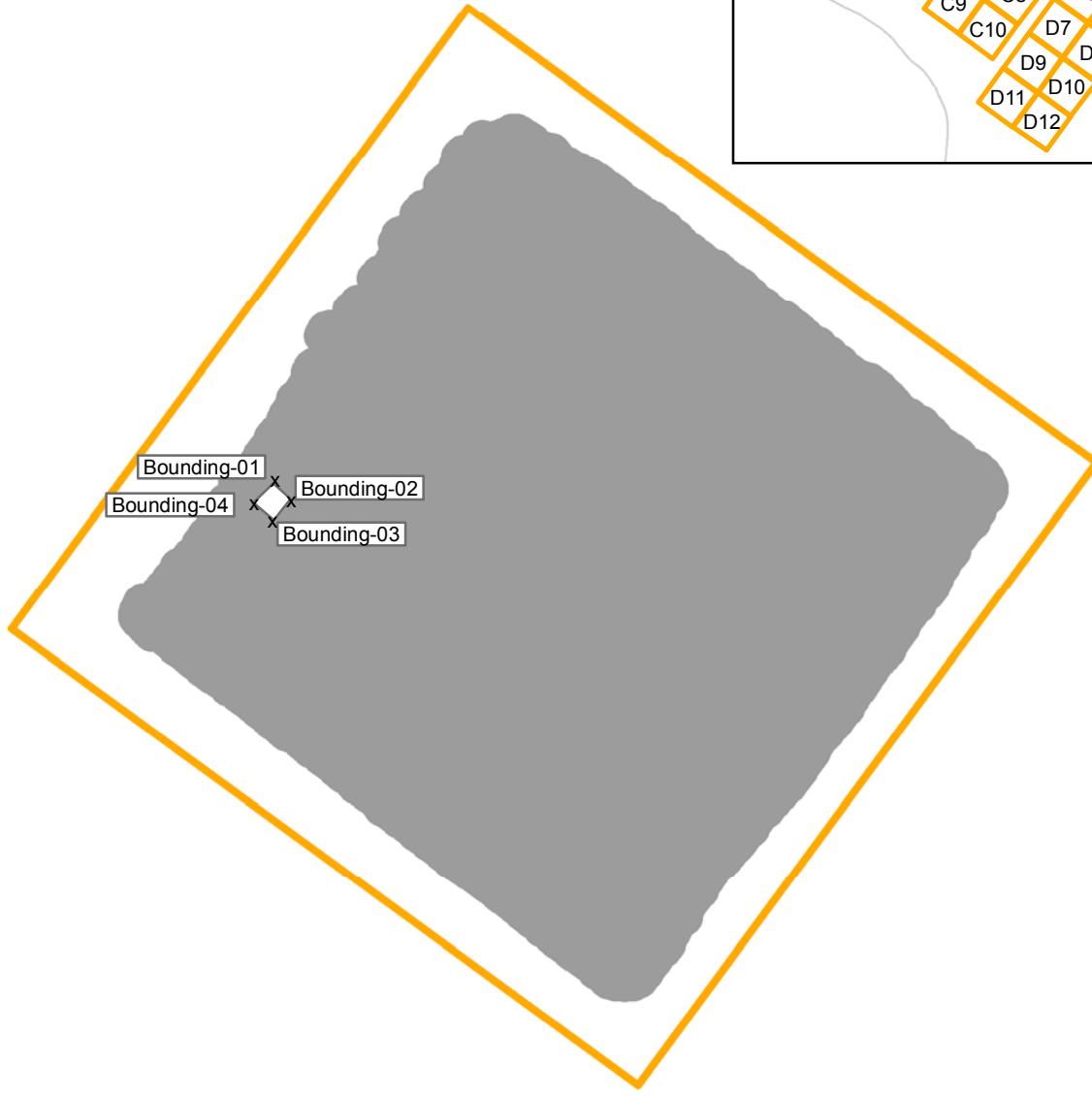
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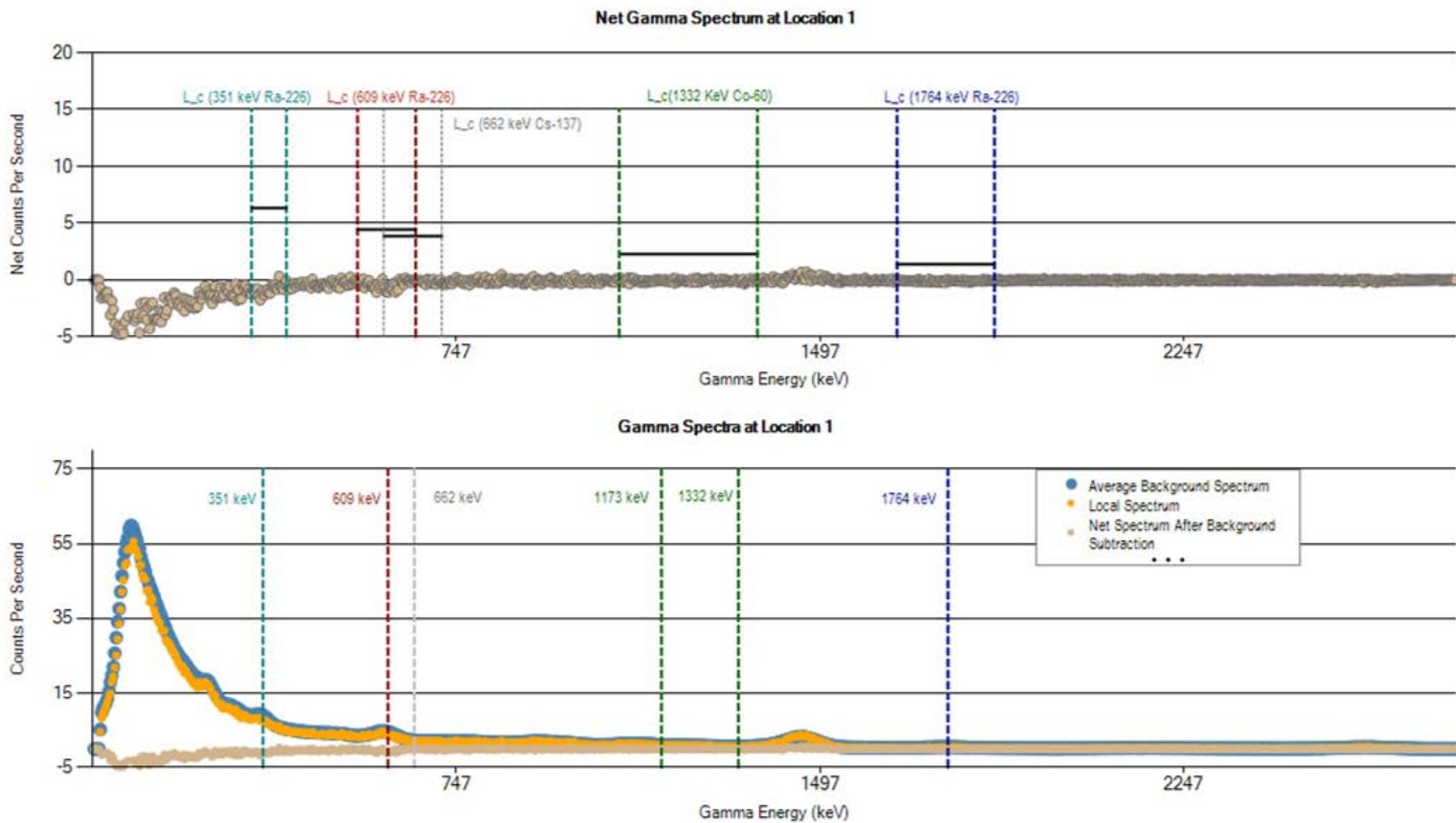
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**Serial Number: 271439**

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Feet

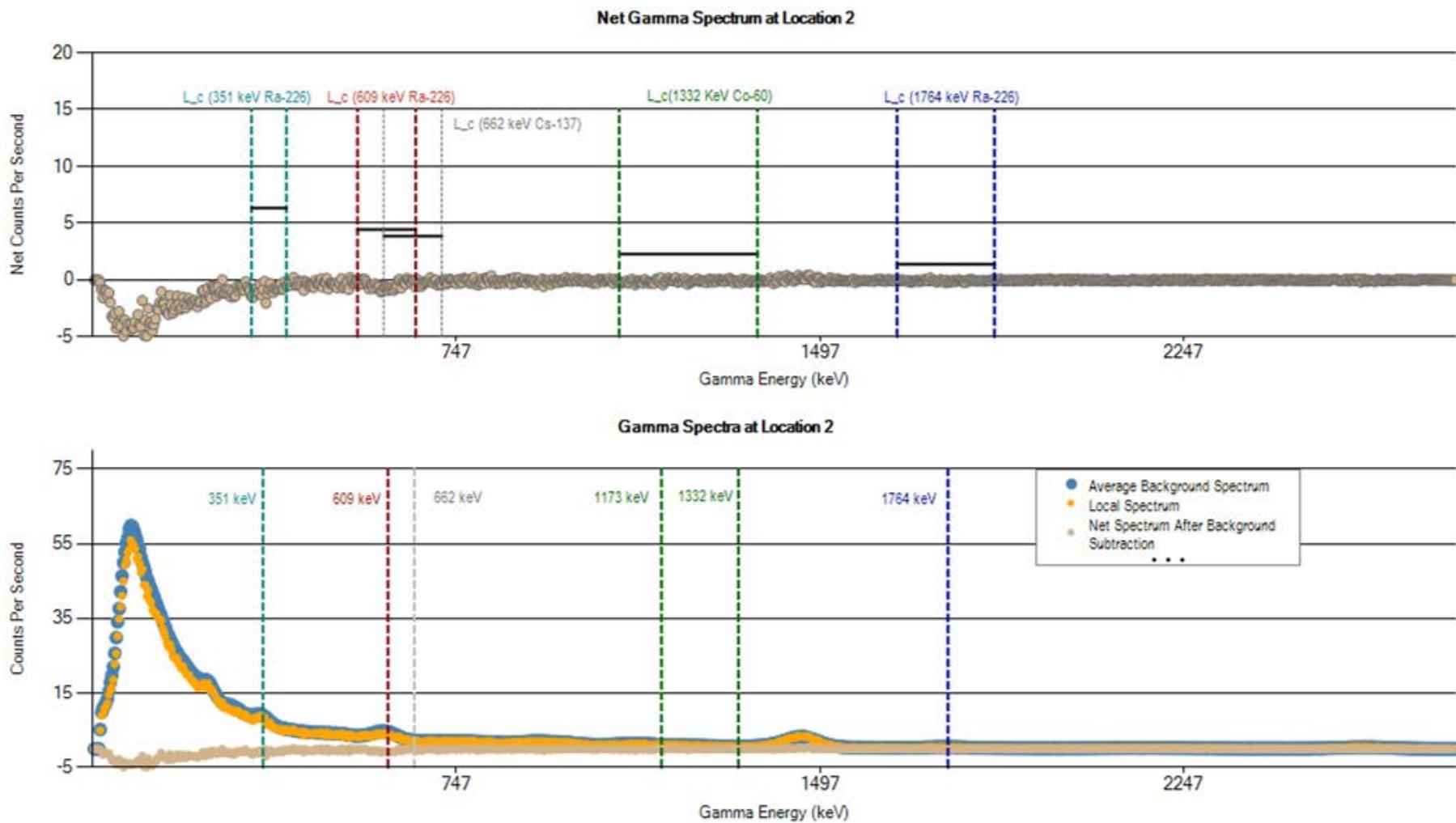
Coordinate system: CSP Zone III, NAD83, US Survey Foot

- x Bounding Sample Locations
- ◊ Excavation Location
- RS-700 GWS Scan Coverage
- RSY Pad Boundaries

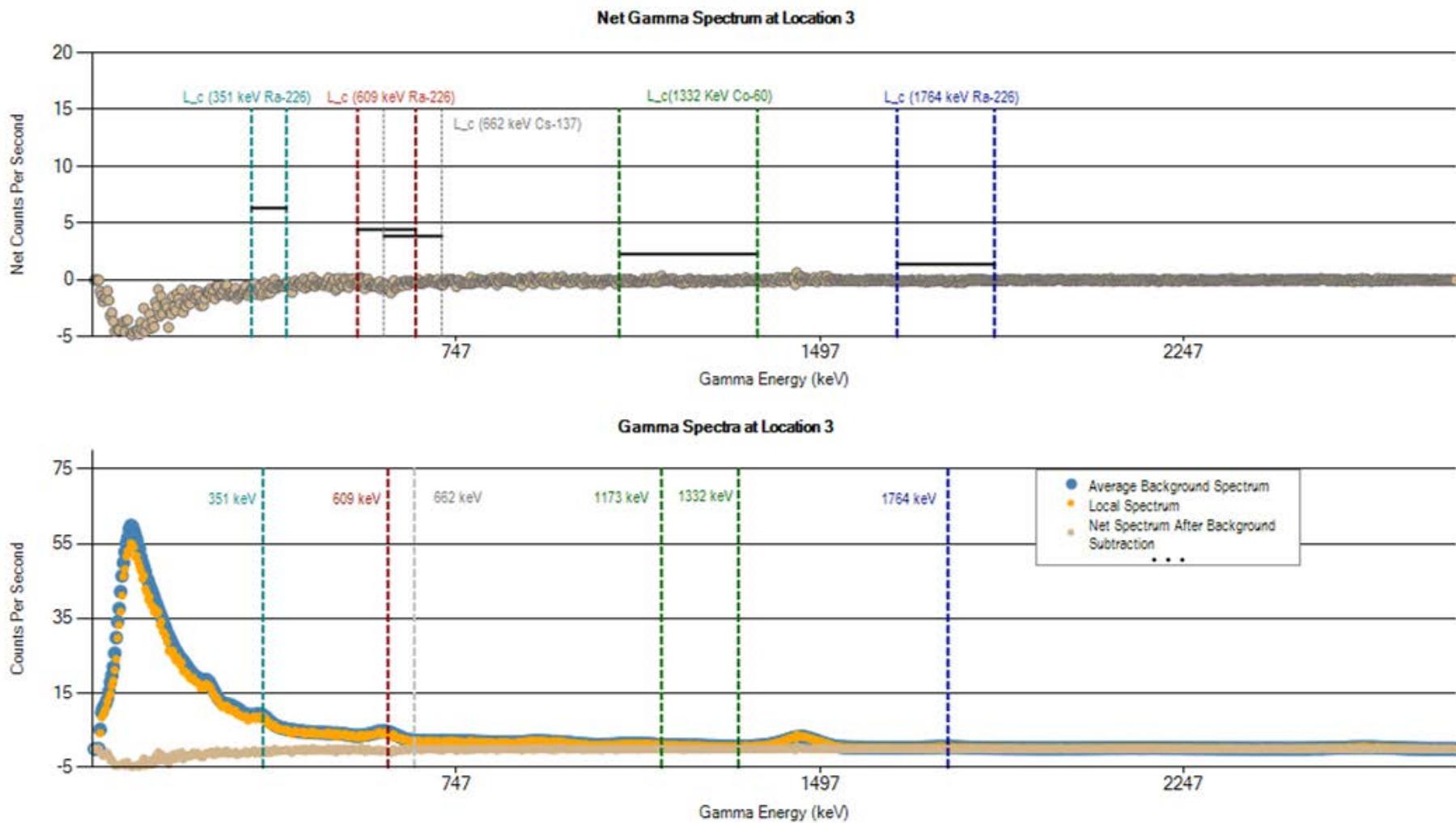




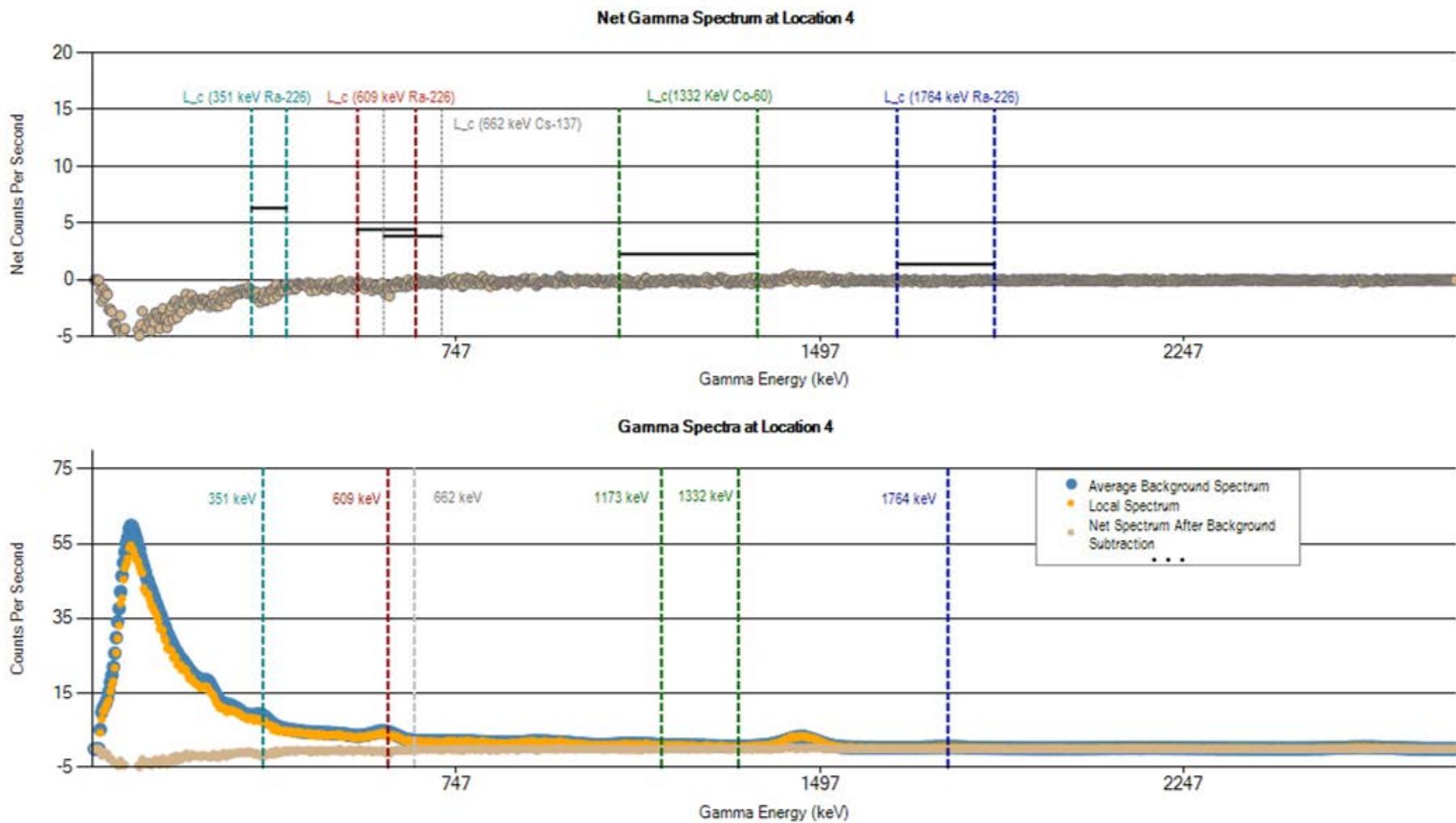
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Location 1 (cps)	810	116	19	20	141	132	101	164	87	3526
Static IL (cps)	1020	144	39	38	196	191	149	232	123	4270



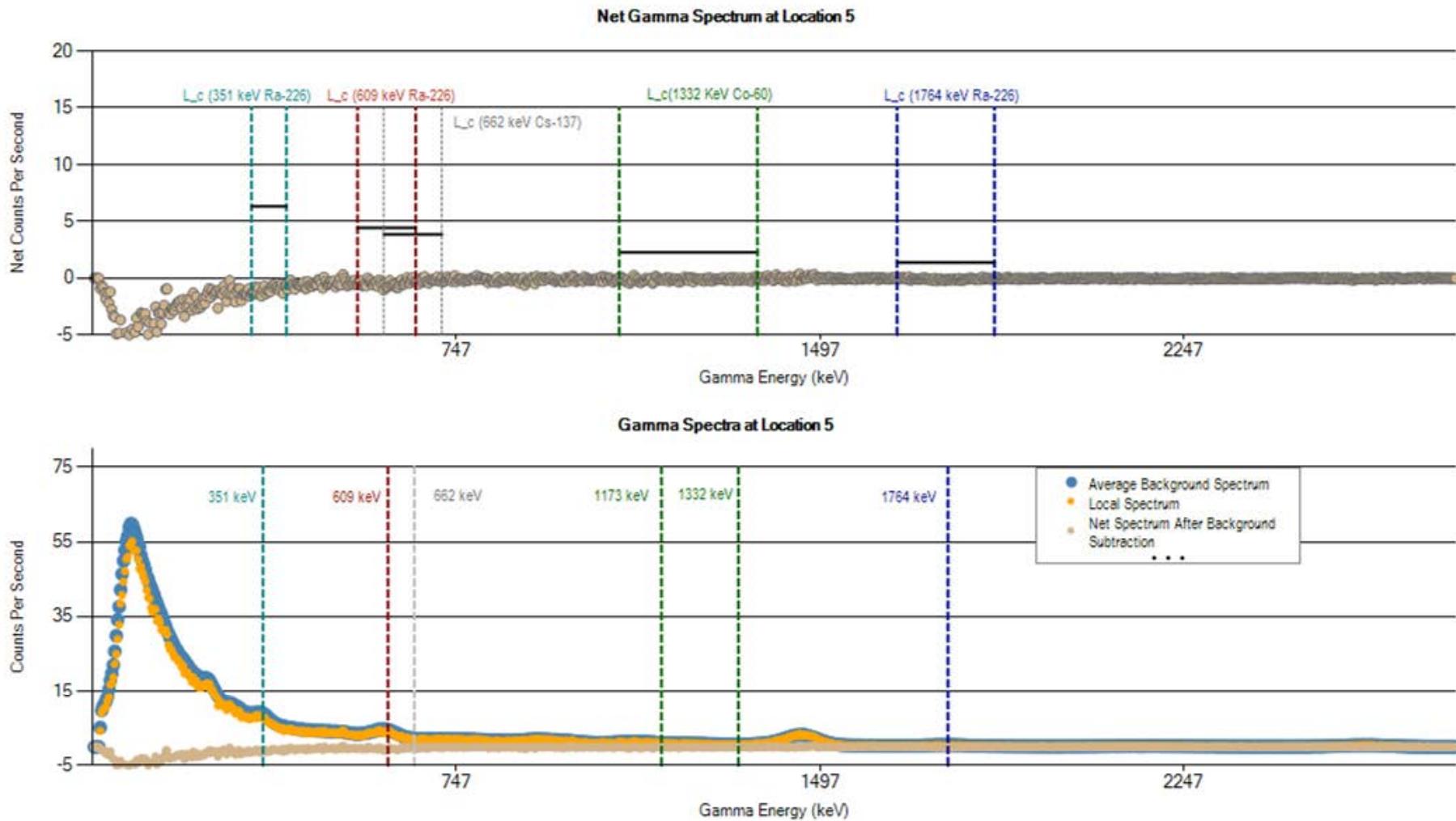
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Location 2 (cps)	805	111	19	21	143	131	100	163	84	3521
Static IL (cps)	1020	144	39	38	196	191	149	232	123	4270



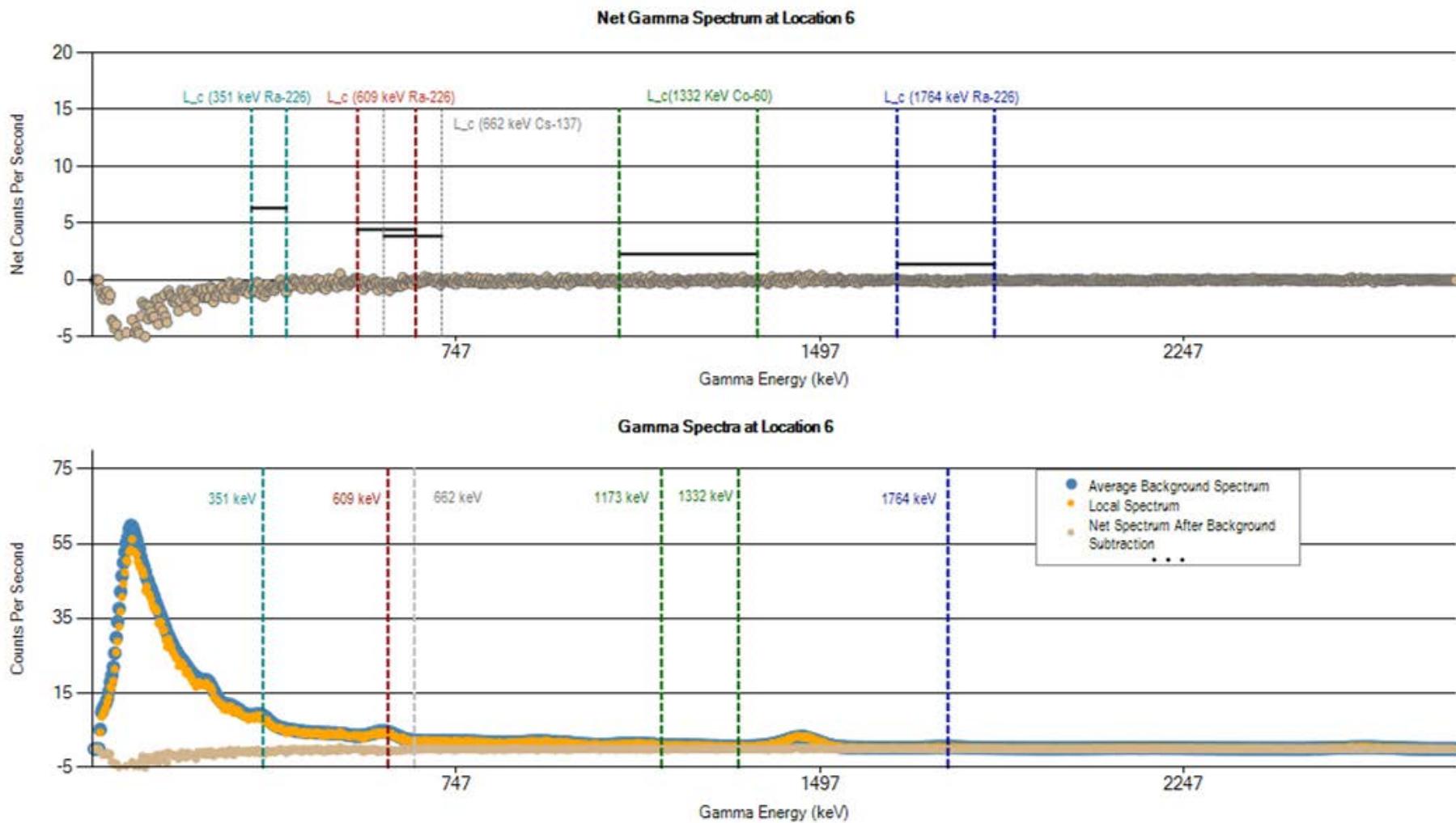
	ROI 1	ROI 2	ROI 3	ROI 4	ROI 5	ROI 6	ROI 7	ROI 8	ROI 9	ROI 10
Location 3 (cps)	811	112	20	22	143	133	100	167	86	3516
Static IL (cps)	1020	144	39	38	196	191	149	232	123	4270



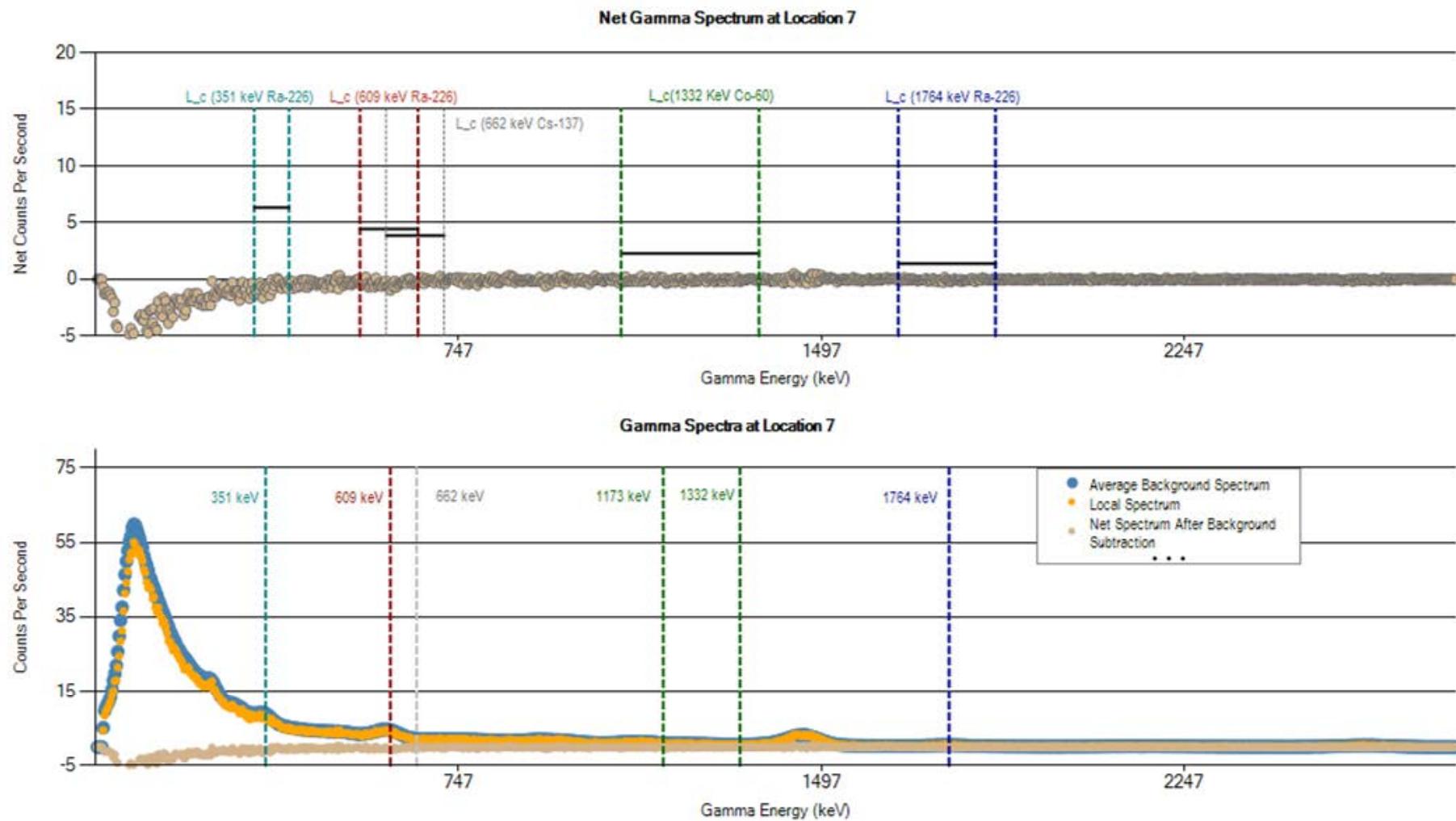
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 4 (cps)	784	114	19	19	135	127	97	155	82	3442
Static IL (cps)	1020	144	39	38	196	191	149	232	123	4270



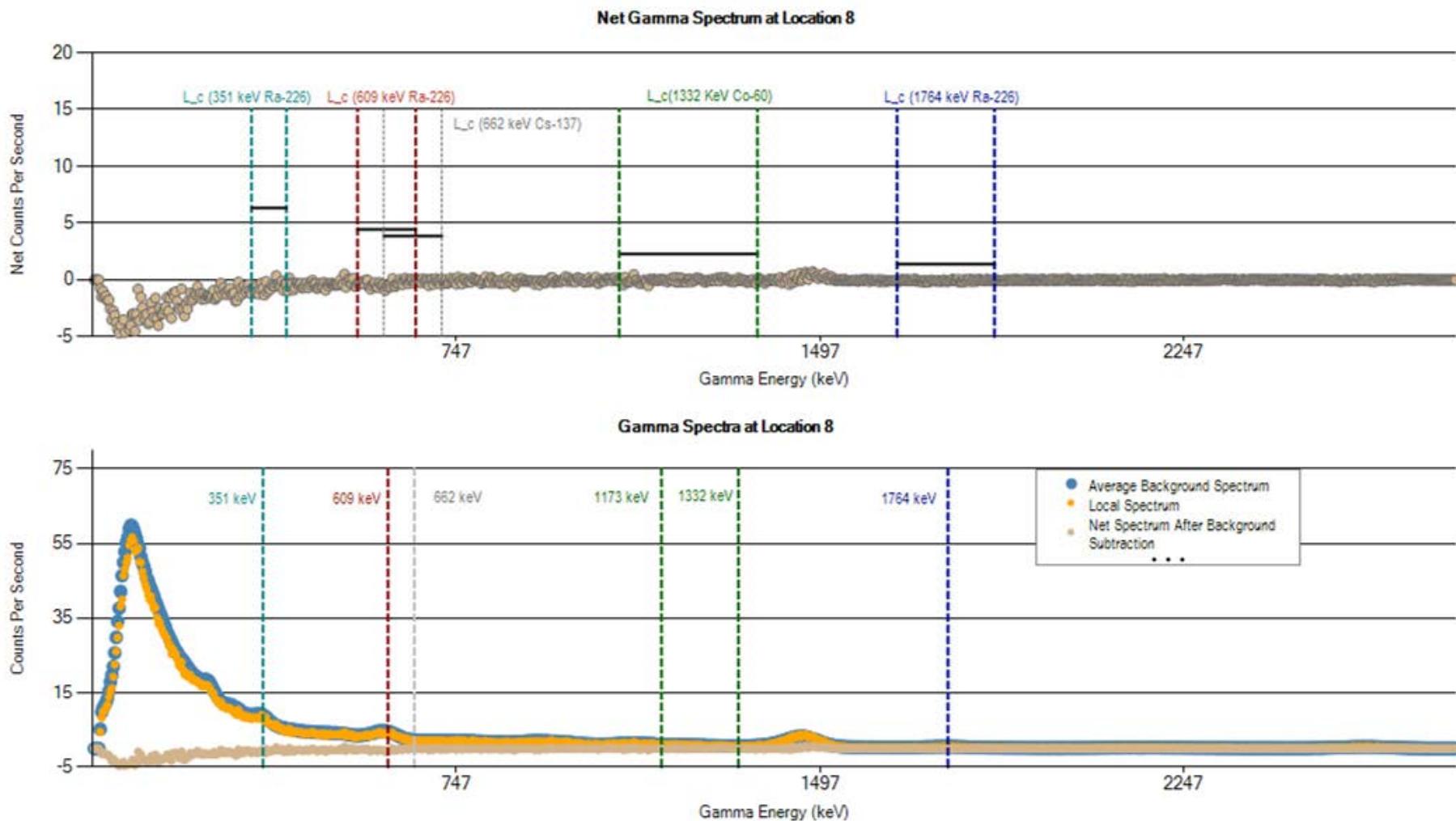
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 5 (cps)	791	110	20	21	139	130	99	159	82	3460
Static IL (cps)	1020	144	39	38	196	191	149	232	123	4270



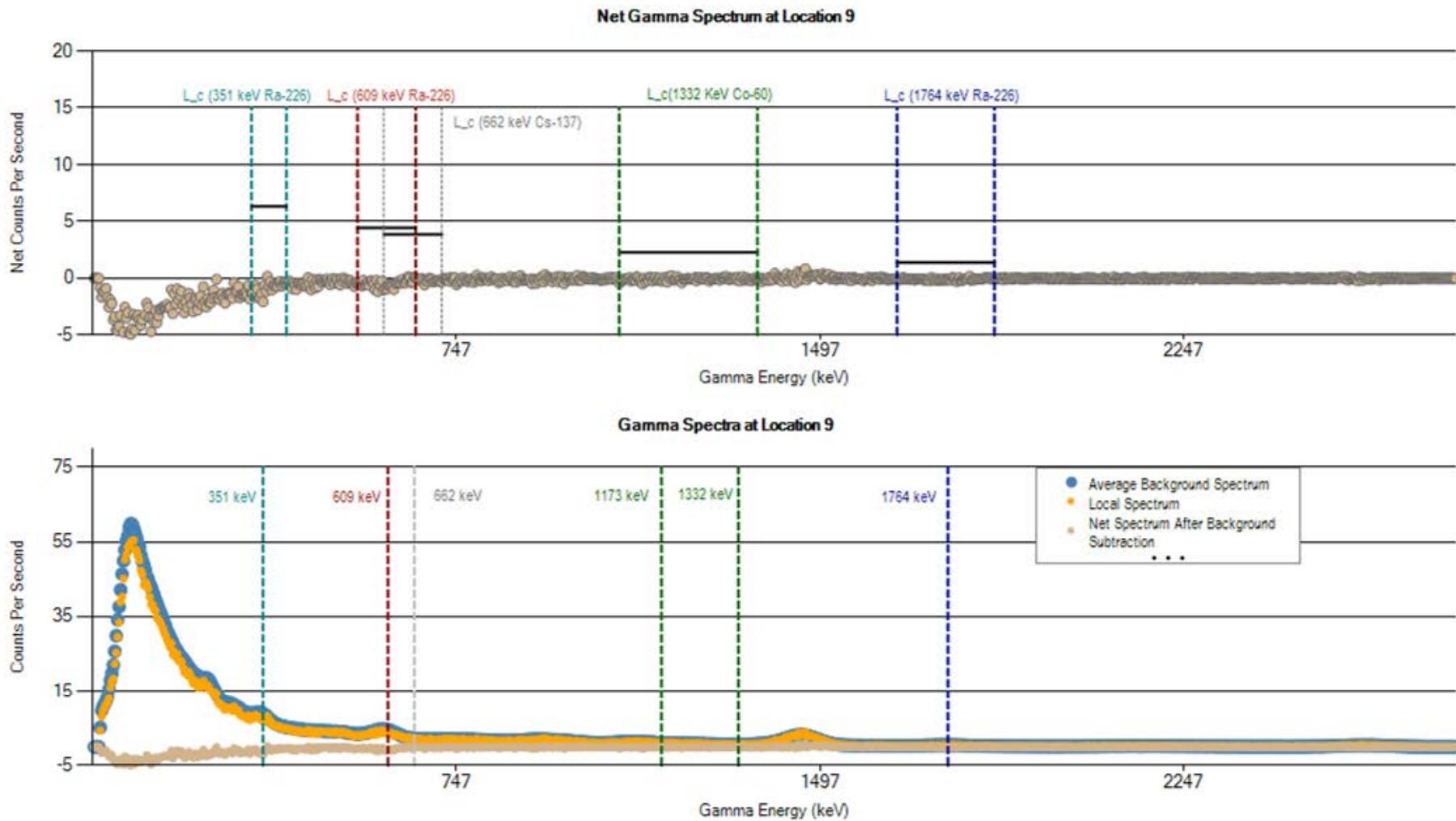
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Location 6 (cps)	819	111	21	22	144	134	104	167	86	3540
Static IL (cps)	1020	144	39	38	196	191	149	232	123	4270



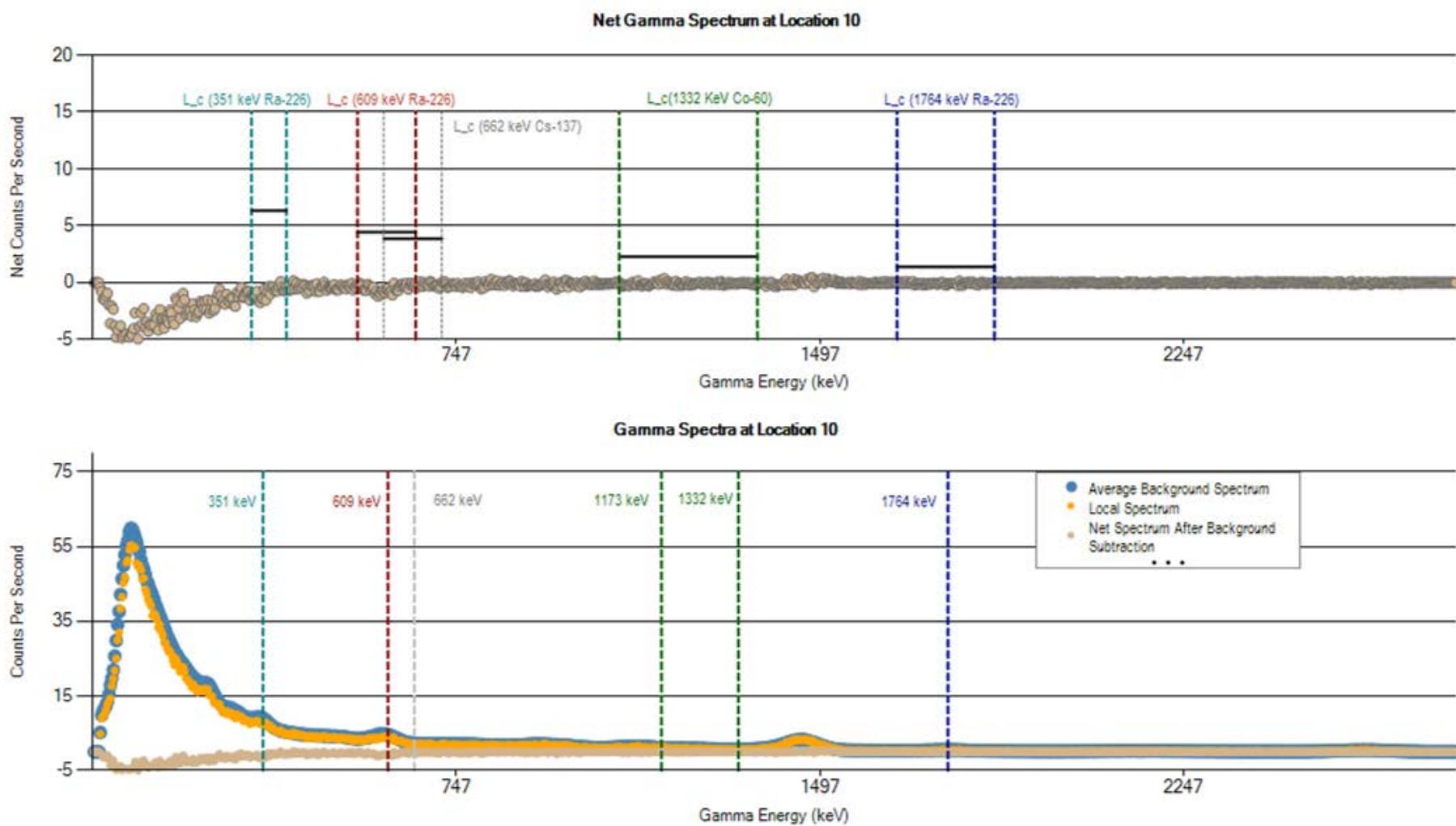
	ROI 1	ROI 2	ROI 3	ROI 4	ROI 5	ROI 6	ROI 7	ROI 8	ROI 9	ROI 10
Location 7 (cps)	815	111	21	21	143	134	103	167	86	3511
Static IL (cps)	1020	144	39	38	196	191	149	232	123	4270



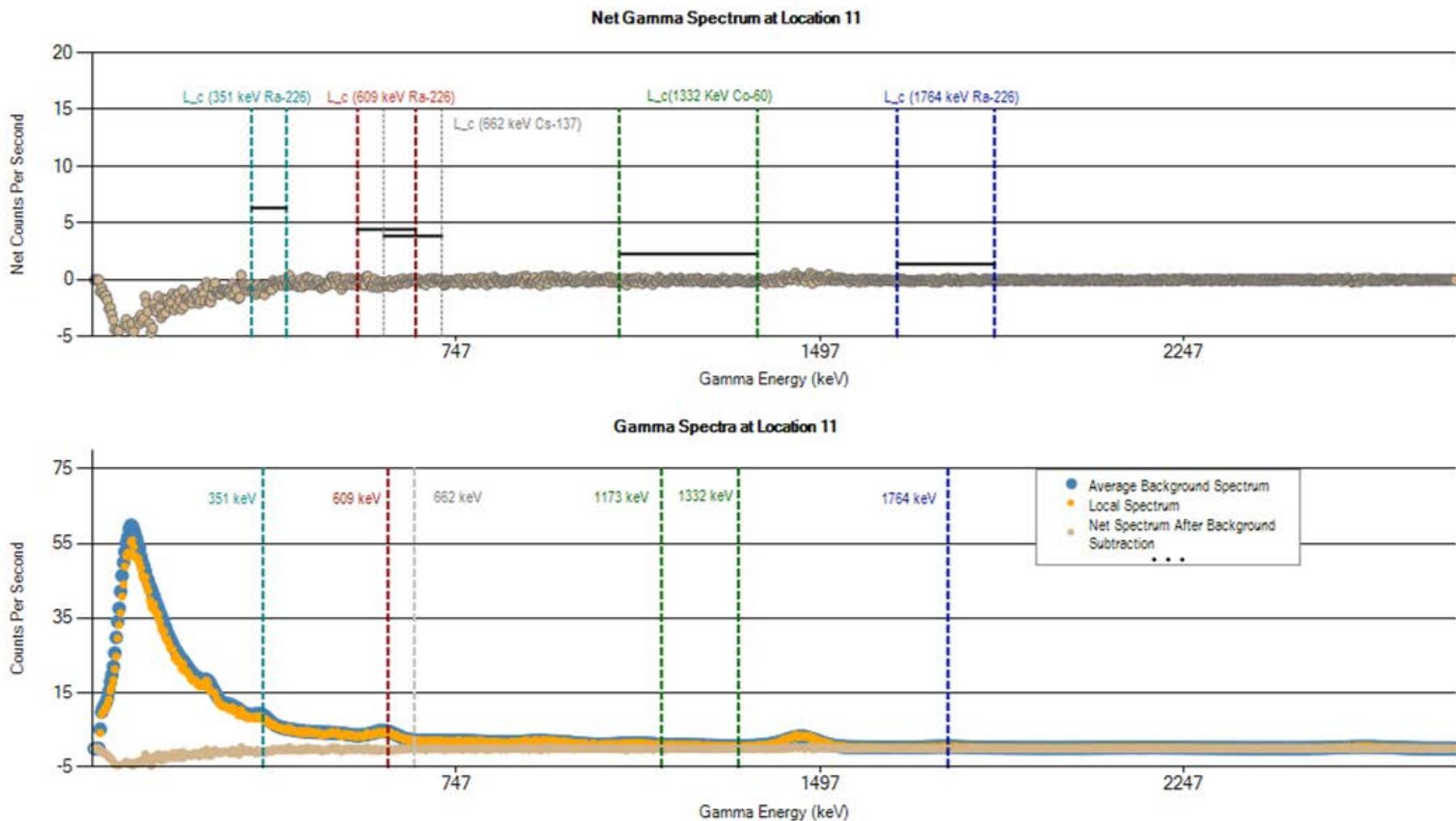
	ROI 1	ROI 2	ROI 3	ROI 4	ROI 5	ROI 6	ROI 7	ROI 8	ROI 9	ROI 10
Location 8 (cps)	818	117	20	21	140	135	104	167	88	3546
Static IL (cps)	1020	144	39	38	196	191	149	232	123	4270



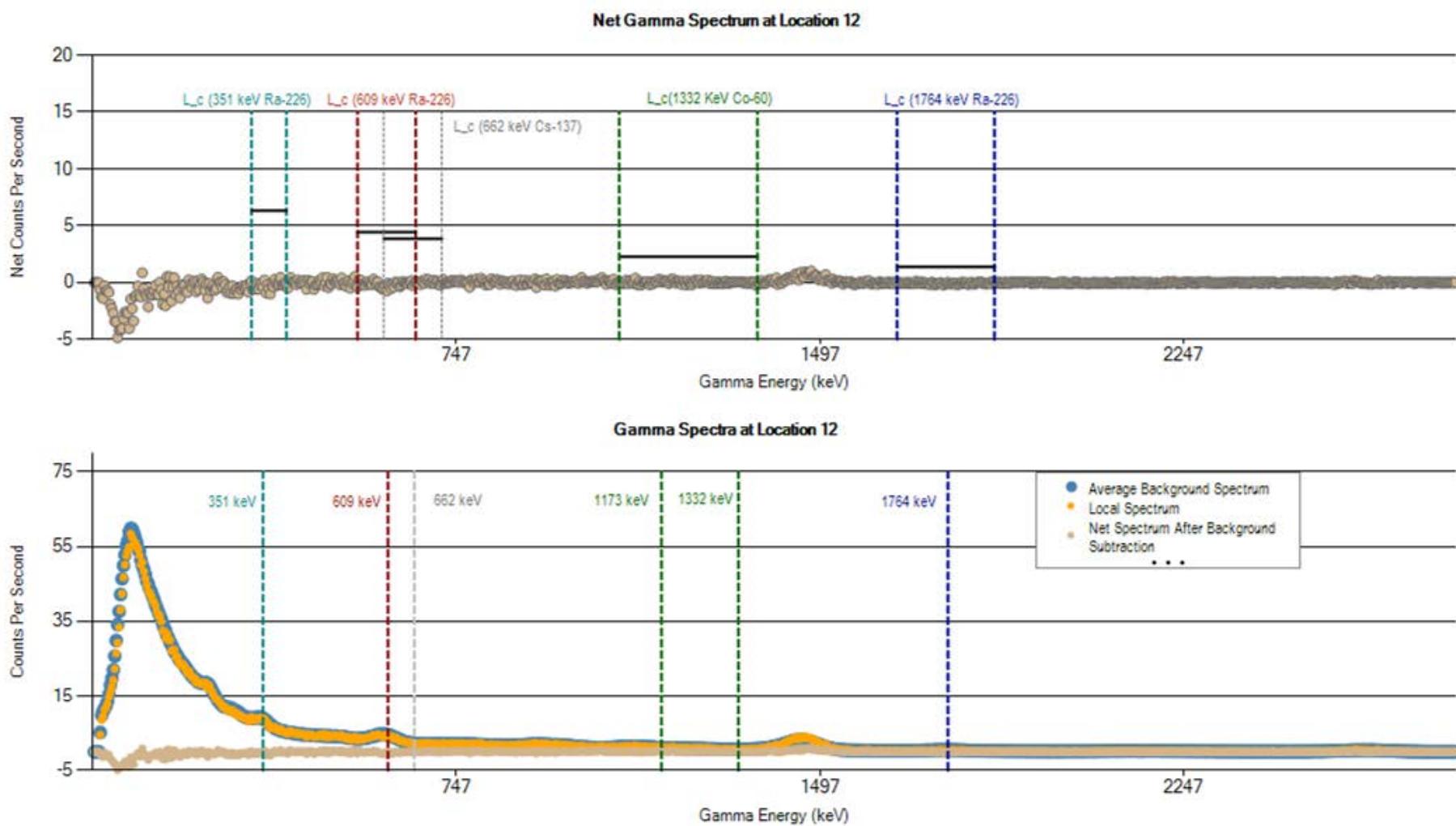
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 9 (cps)	802	114	19	21	140	130	100	164	85	3499
Static IL (cps)	1020	144	39	38	196	191	149	232	123	4270



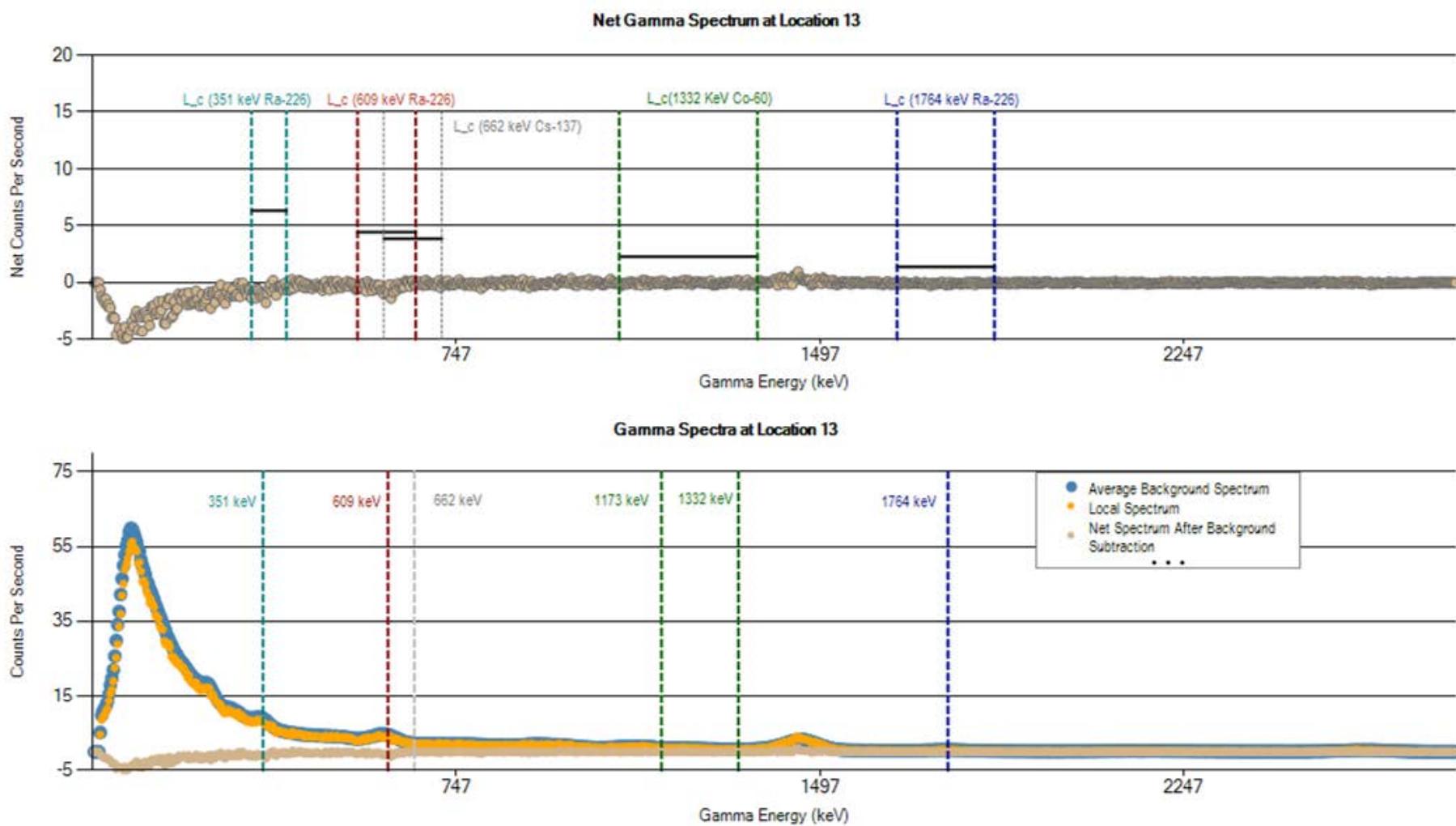
	ROI 1	ROI 2	ROI 3	ROI 4	ROI 5	ROI 6	ROI 7	ROI 8	ROI 9	ROI 10
Location 10 (cps)	790	111	19	21	138	127	99	163	83	3464
Static IL (cps)	1020	144	39	38	196	191	149	232	123	4270



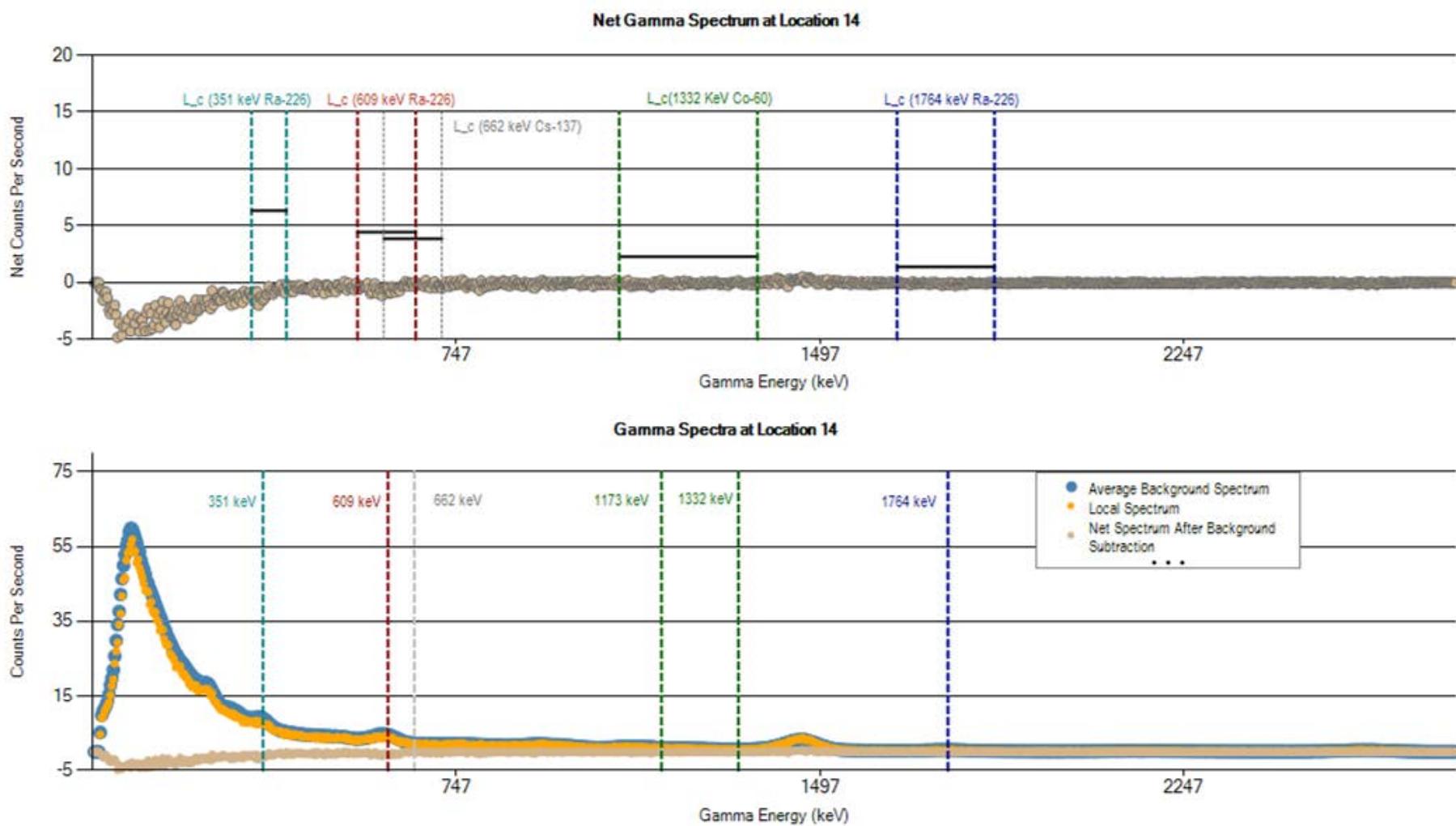
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 11 (cps)	831	115	21	23	145	138	106	169	86	3554
Static IL (cps)	1020	144	39	38	196	191	149	232	123	4270



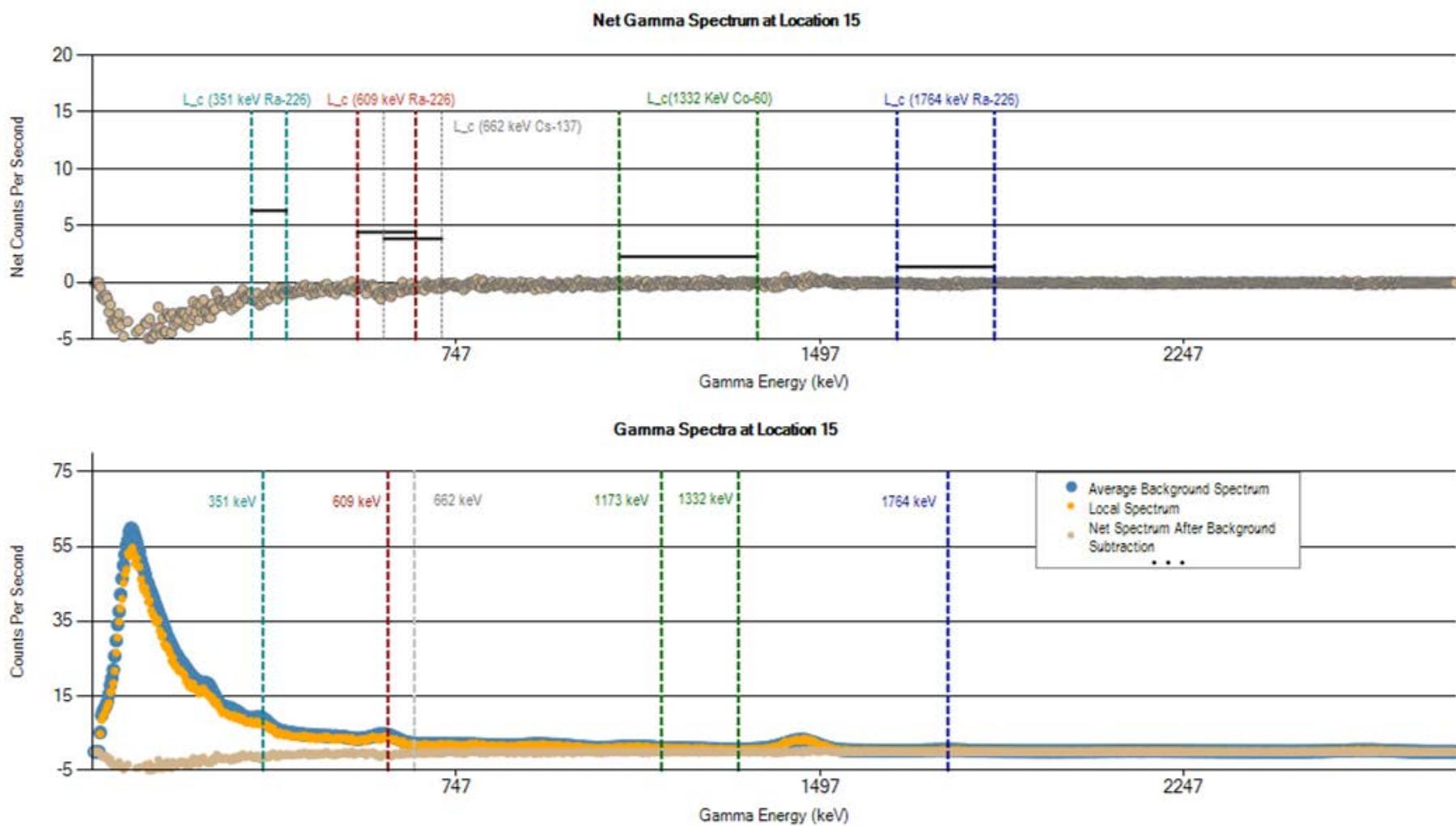
	ROI 1	ROI 2	ROI 3	ROI 4	ROI 5	ROI 6	ROI 7	ROI 8	ROI 9	ROI 10
Location 12 (cps)	884	128	21	23	153	143	110	177	95	3745
Static IL (cps)	1020	144	39	38	196	191	149	232	123	4270



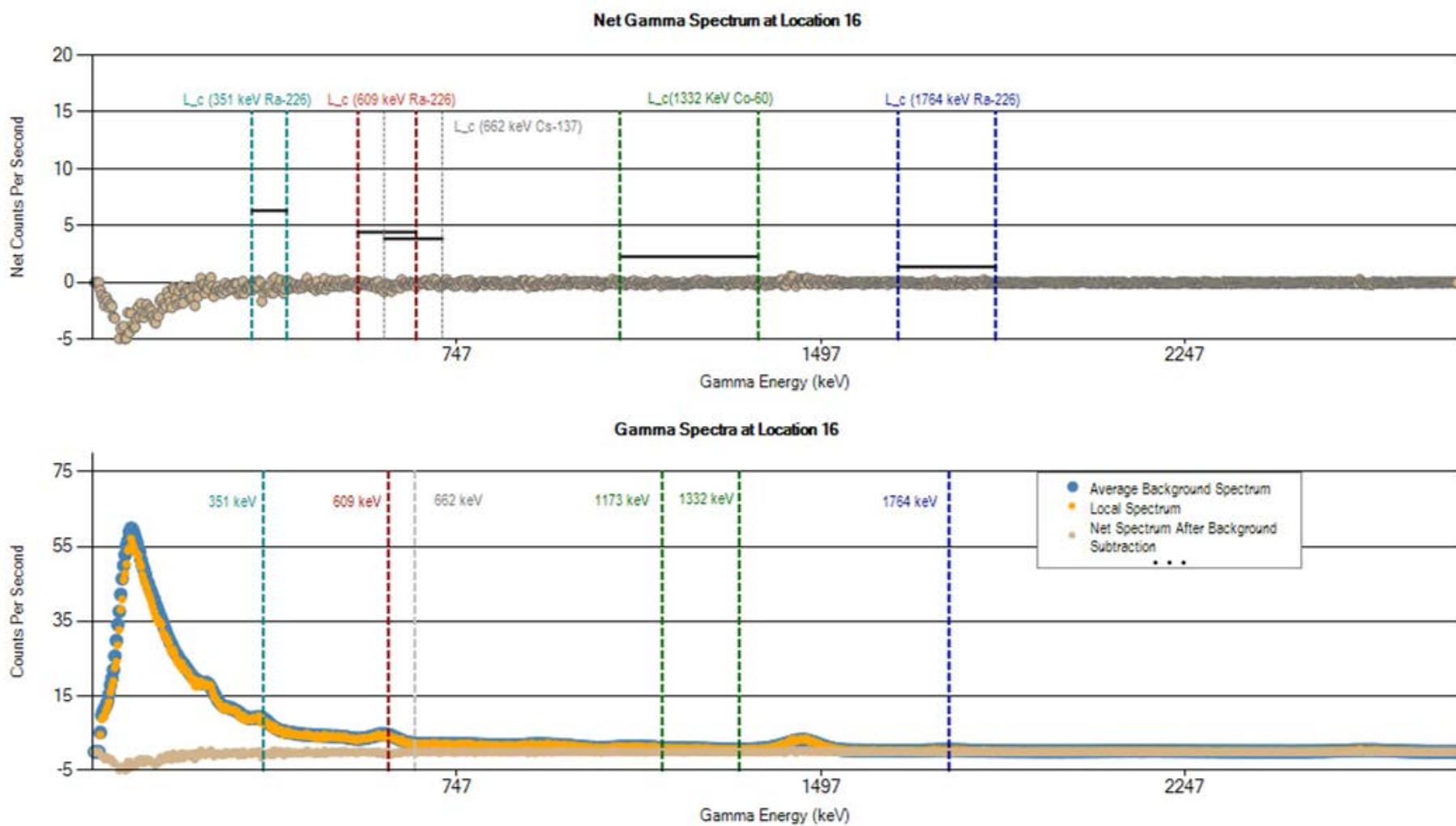
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 13 (cps)	828	118	20	21	143	133	103	167	90	3561
Static IL (cps)	1020	144	39	38	196	191	149	232	123	4270



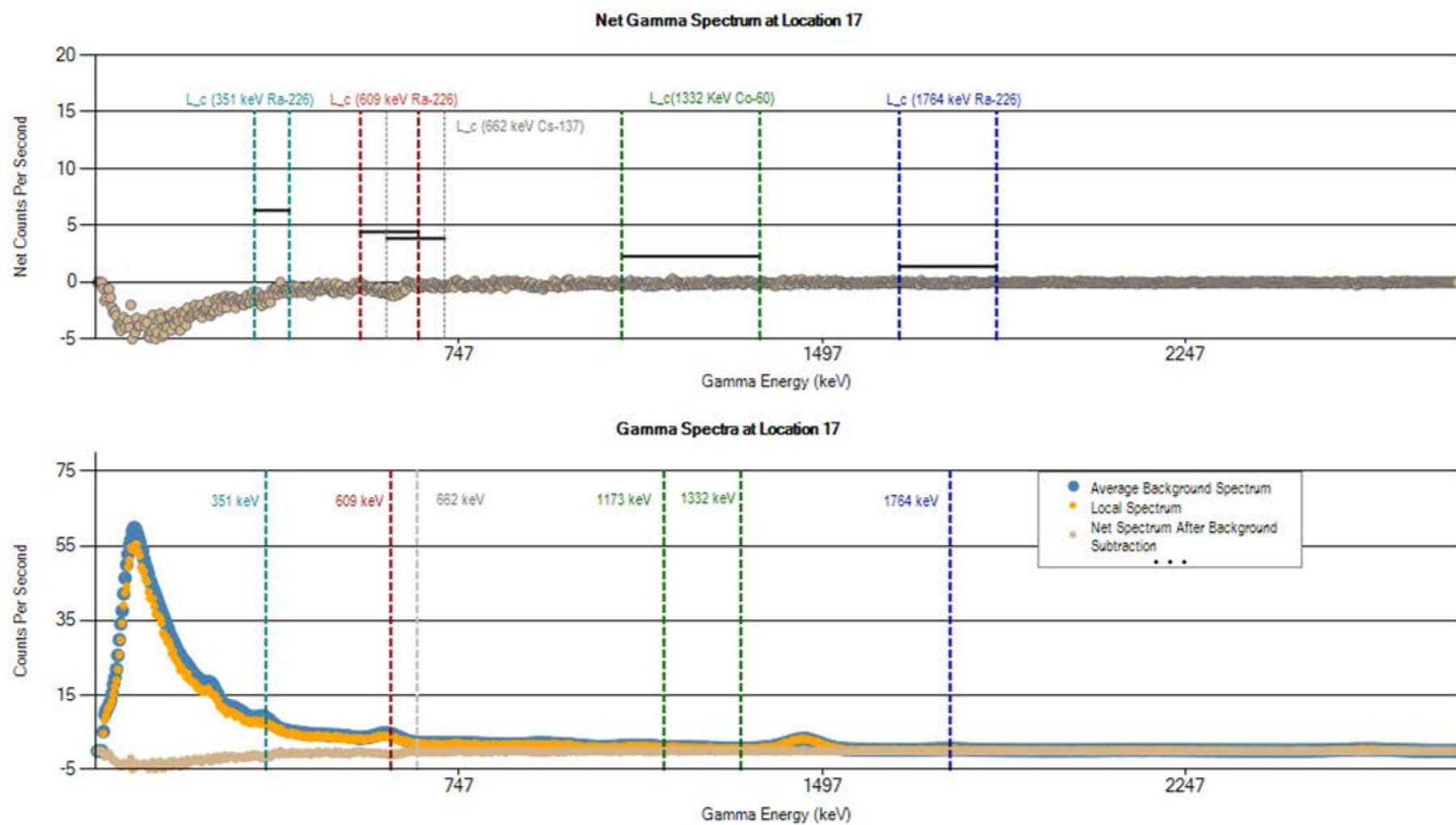
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 14 (cps)	798	116	19	21	138	130	100	161	85	3487
Static IL (cps)	1020	144	39	38	196	191	149	232	123	4270



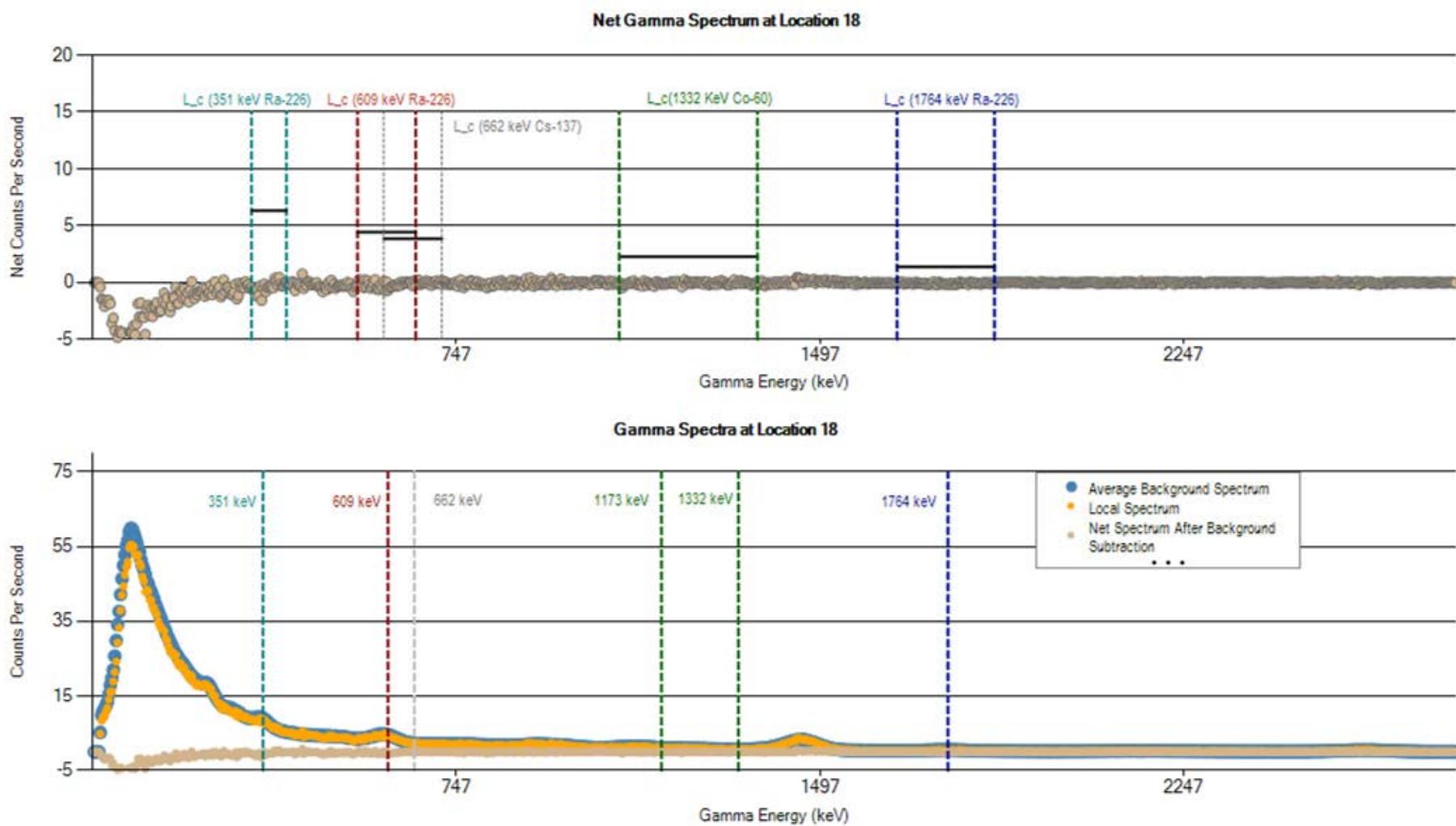
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 15 (cps)	764	110	18	19	134	123	93	155	83	3389
Static IL (cps)	1020	144	39	38	196	191	149	232	123	4270



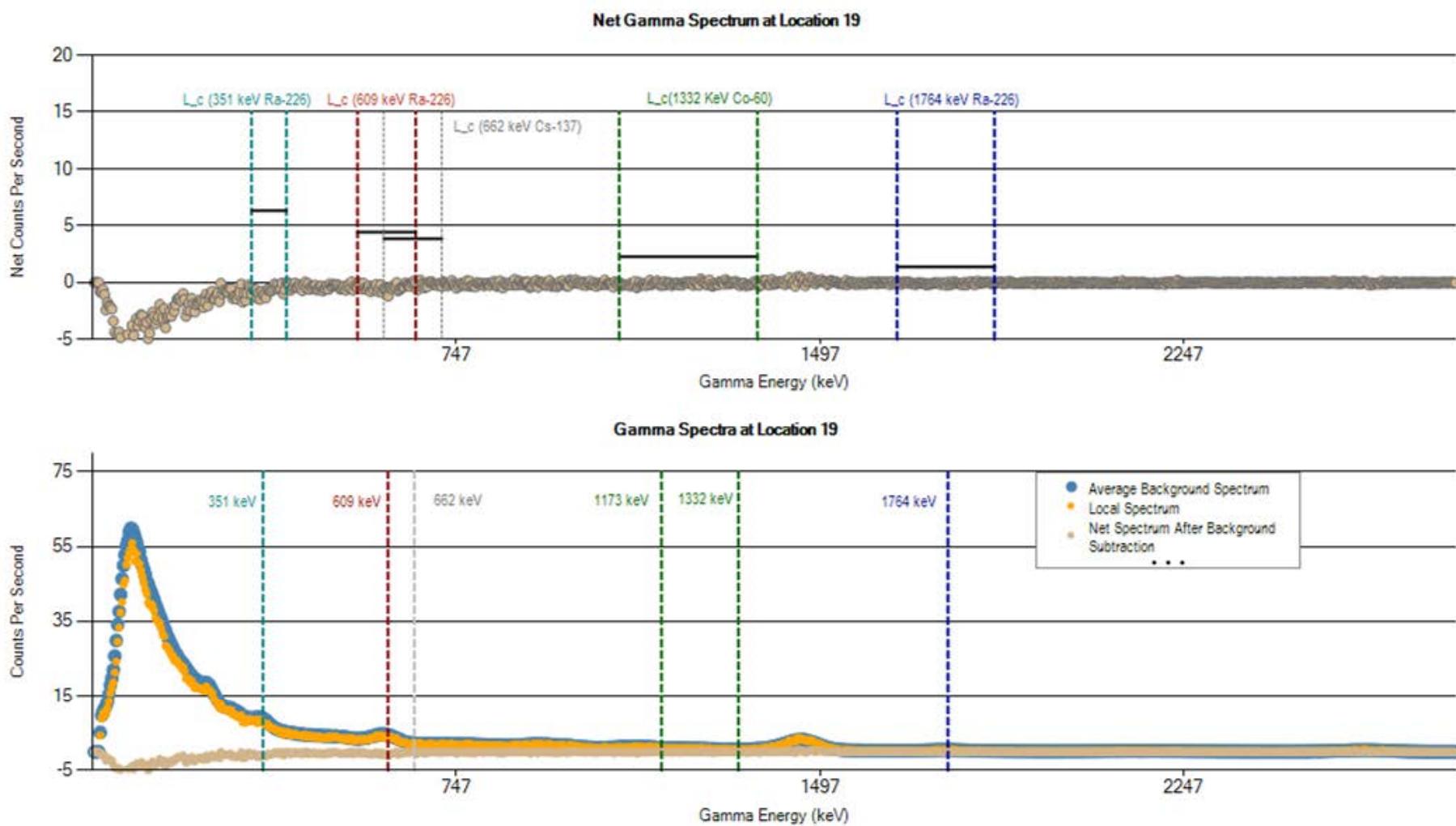
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 16 (cps)	836	113	22	22	147	140	107	175	88	3624
Static IL (cps)	1020	144	39	38	196	191	149	232	123	4270



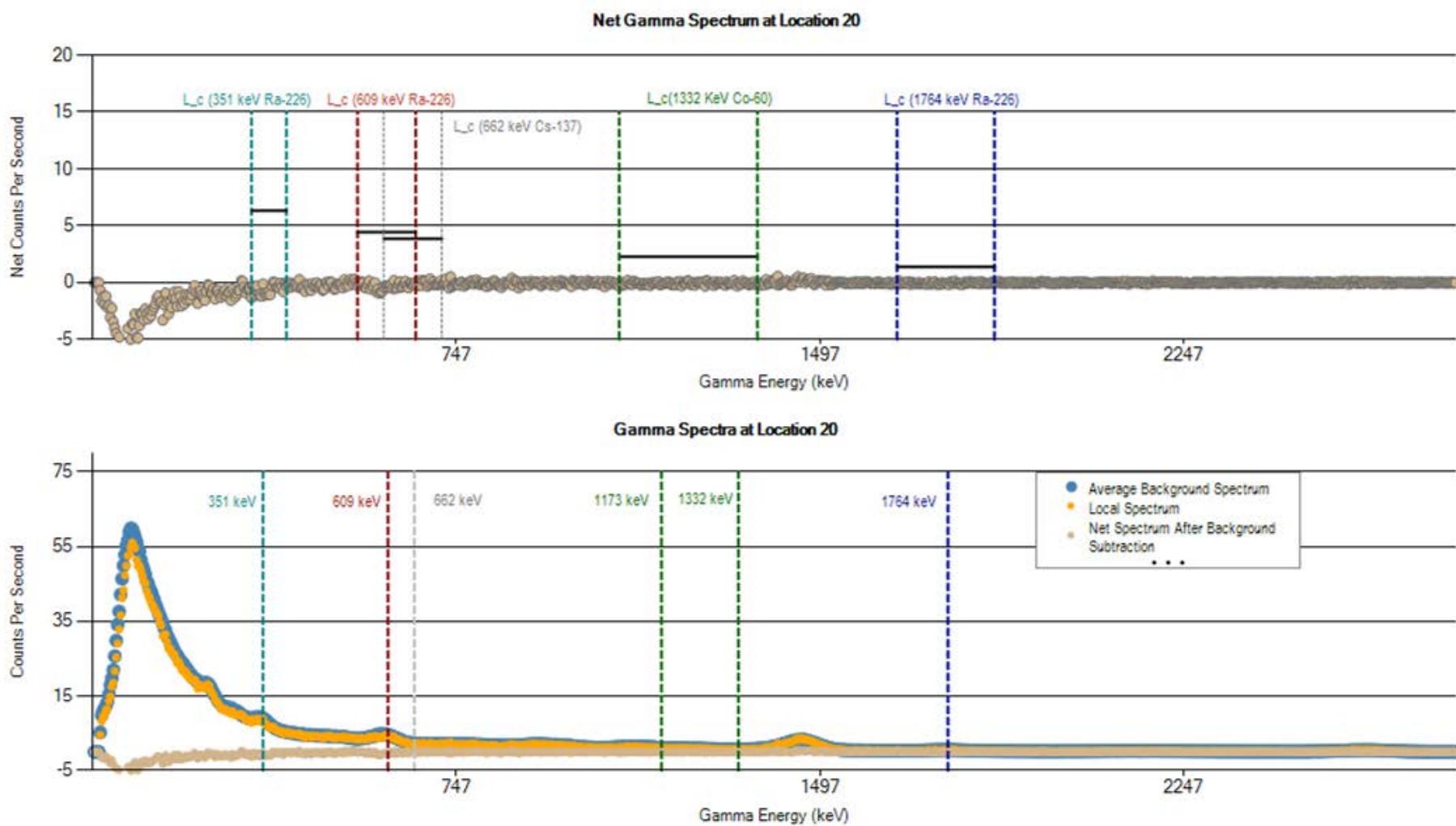
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 17 (cps)	763	107	20	20	134	124	94	157	83	3409
Static IL (cps)	1020	144	39	38	196	191	149	232	123	4270



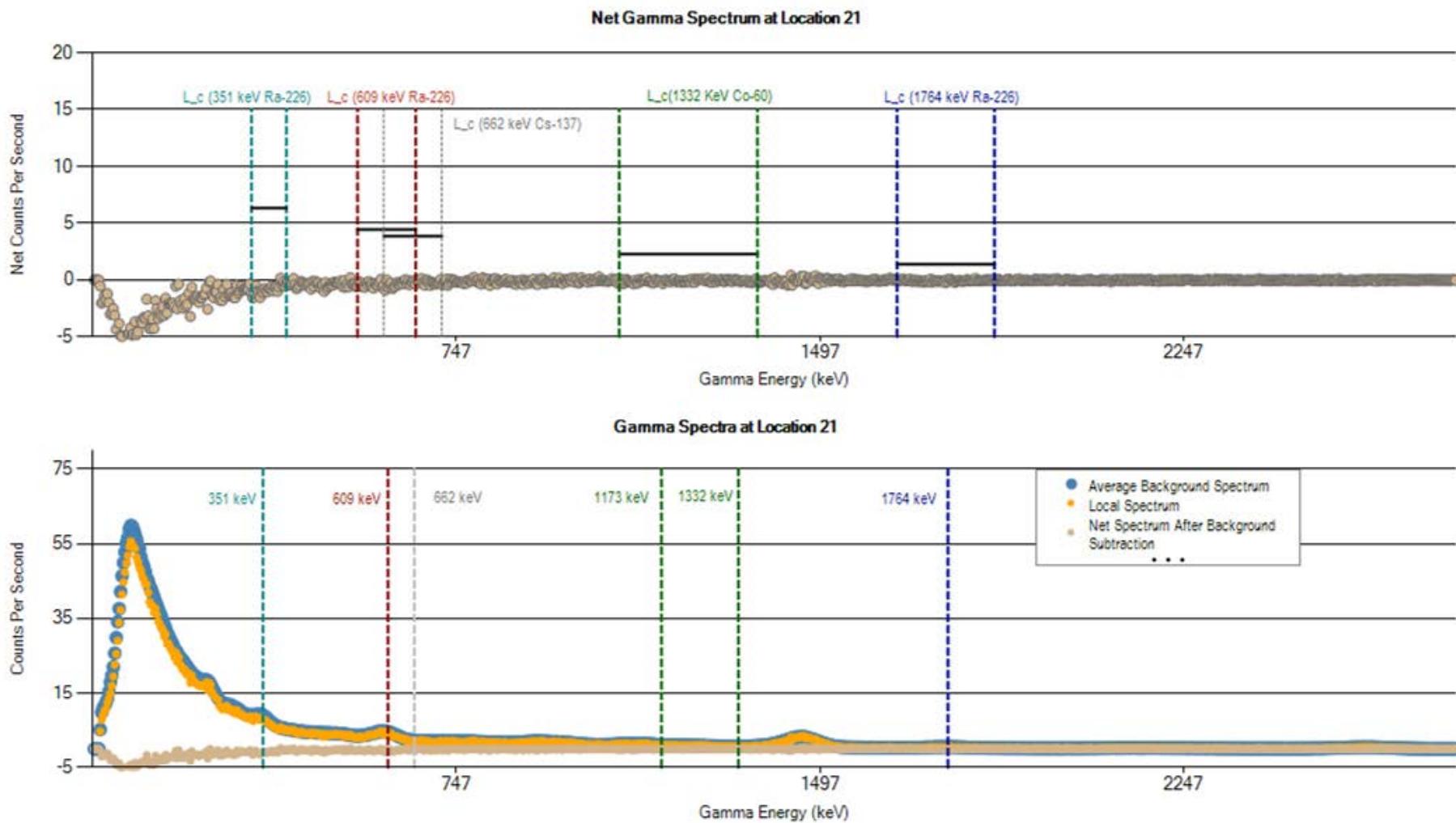
	ROI 1	ROI 2	ROI 3	ROI 4	ROI 5	ROI 6	ROI 7	ROI 8	ROI 9	ROI 10
Location 18 (cps)	835	113	20	22	143	141	109	174	87	3605
Static IL (cps)	1020	144	39	38	196	191	149	232	123	4270



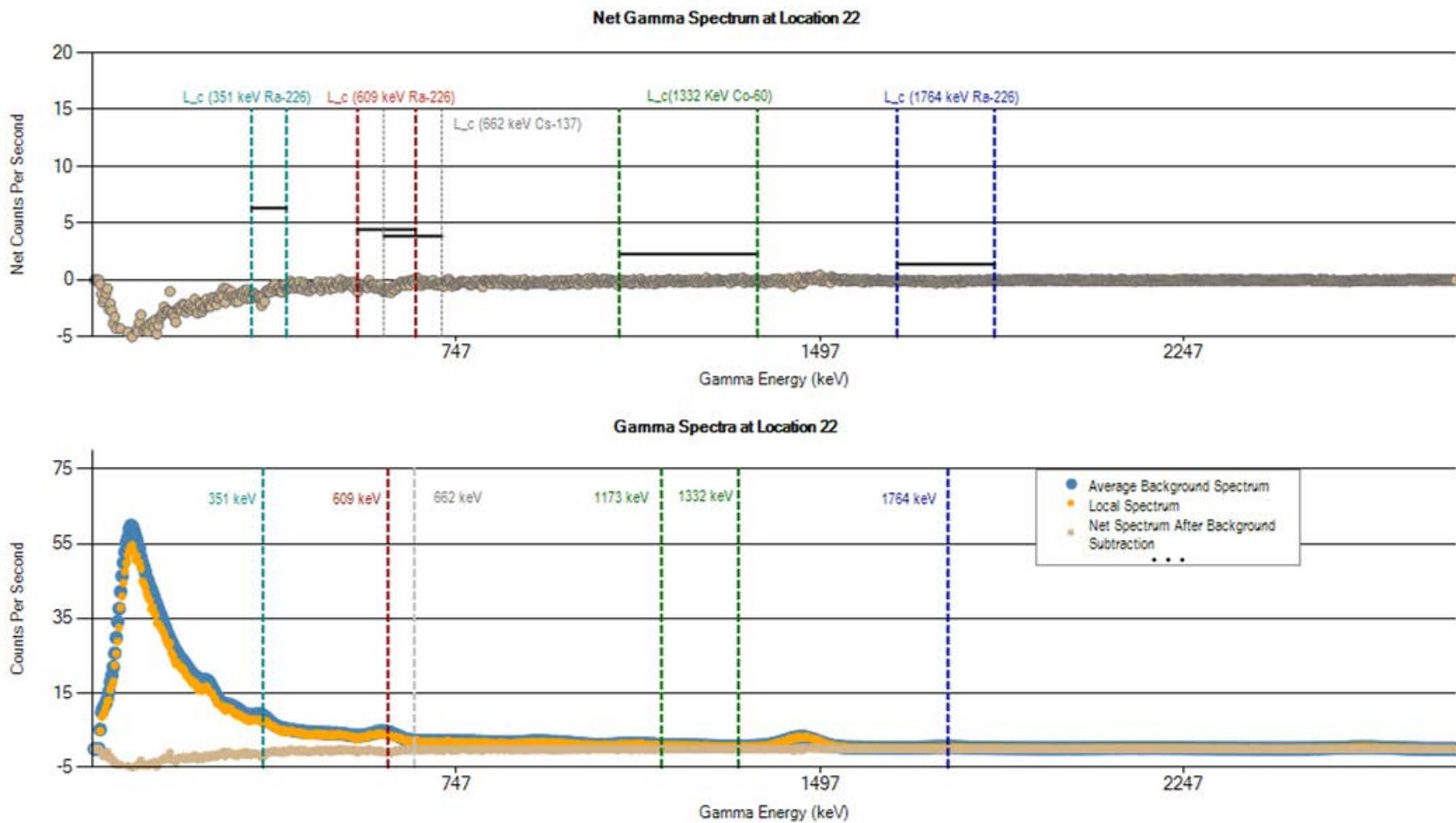
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 19 (cps)	805	113	21	21	139	132	102	167	83	3506
Static IL (cps)	1020	144	39	38	196	191	149	232	123	4270



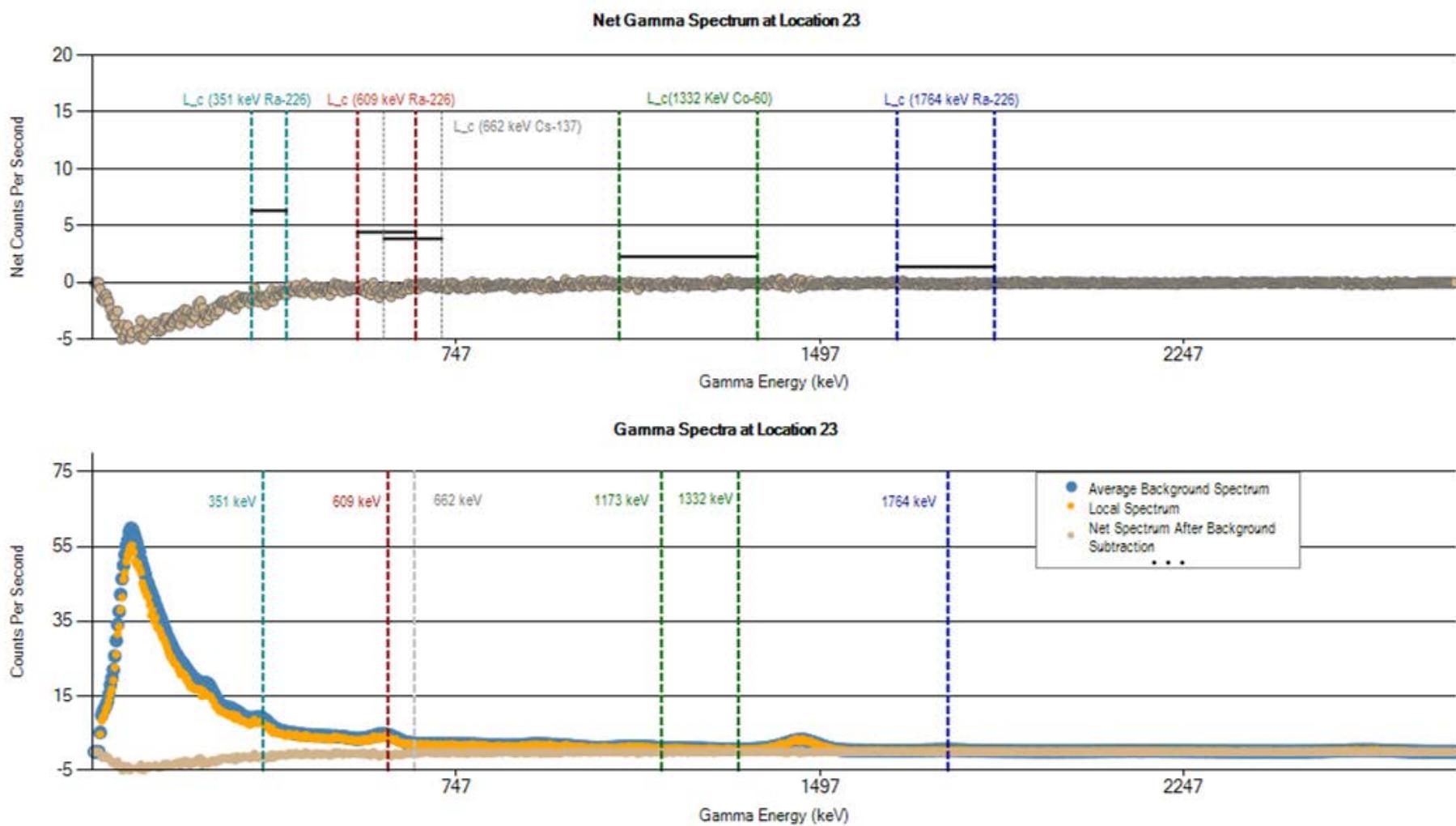
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 20 (cps)	830	113	21	23	147	136	107	170	86	3580
Static IL (cps)	1020	144	39	38	196	191	149	232	123	4270



	ROI 1	ROI 2	ROI 3	ROI 4	ROI 5	ROI 6	ROI 7	ROI 8	ROI 9	ROI 10
Location 21 (cps)	801	107	20	21	139	134	101	165	84	3512
Static IL (cps)	1020	144	39	38	196	191	149	232	123	4270



	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 22 (cps)	771	109	18	20	136	127	96	157	83	3422
Static IL (cps)	1020	144	39	38	196	191	149	232	123	4270



	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 23 (cps)	752	105	18	19	133	123	94	155	80	3375
Static IL (cps)	1020	144	39	38	196	191	149	232	123	4270

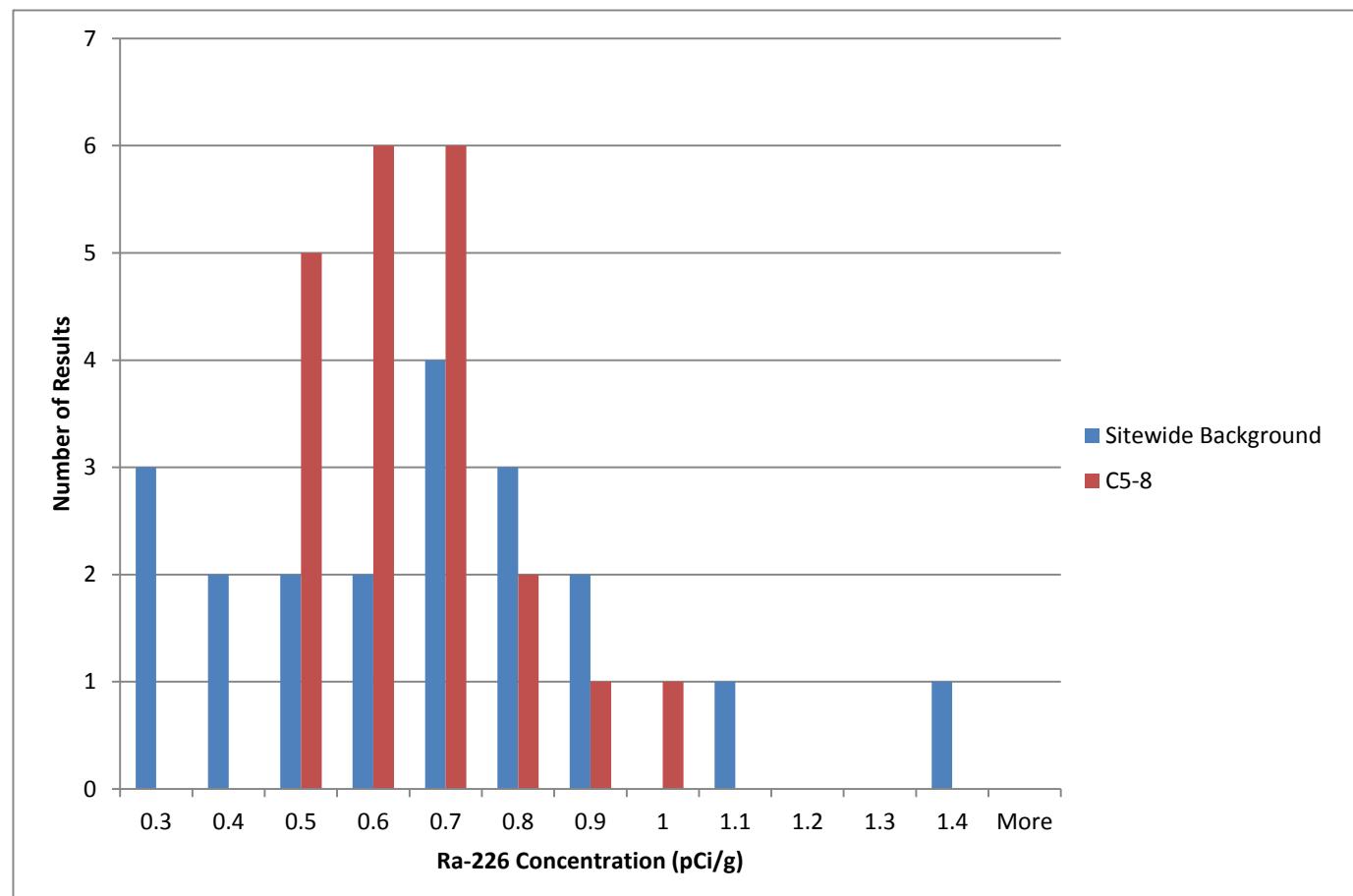
## Histogram, RSY C5 (Use 8) vs. Sitewide Background

## Background

Bin	Frequency
0.3	3
0.4	2
0.5	2
0.6	2
0.7	4
0.8	3
0.9	2
1	0
1.1	1
1.2	0
1.3	0
1.4	1
More	0

## C5-8

Bin	Frequency
0.3	0
0.4	0
0.5	5
0.6	6
0.7	6
0.8	2
0.9	1
1	1
1.1	0
1.2	0
1.3	0
1.4	0
More	0



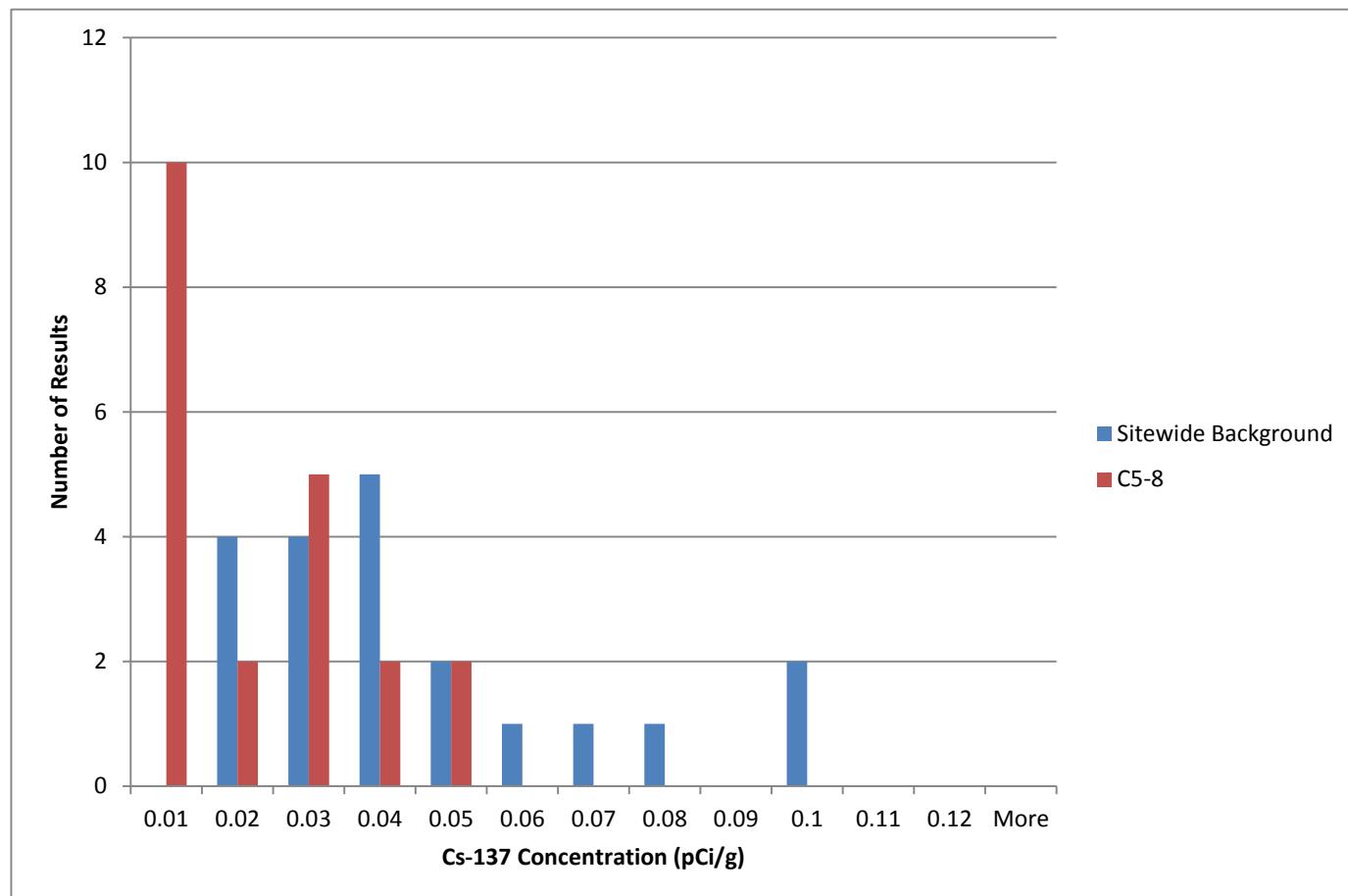
## Histogram, RSY C5 (Use 8) vs. Sitewide Background

## Background

Bin	Frequency
0.01	0
0.02	4
0.03	4
0.04	5
0.05	2
0.06	1
0.07	1
0.08	1
0.09	0
0.1	2
0.11	0
0.12	0
More	0

## C5-8

Bin	Frequency
0.01	10
0.02	2
0.03	5
0.04	2
0.05	2
0.06	0
0.07	0
0.08	0
0.09	0
0.1	0
0.11	0
0.12	0
More	0



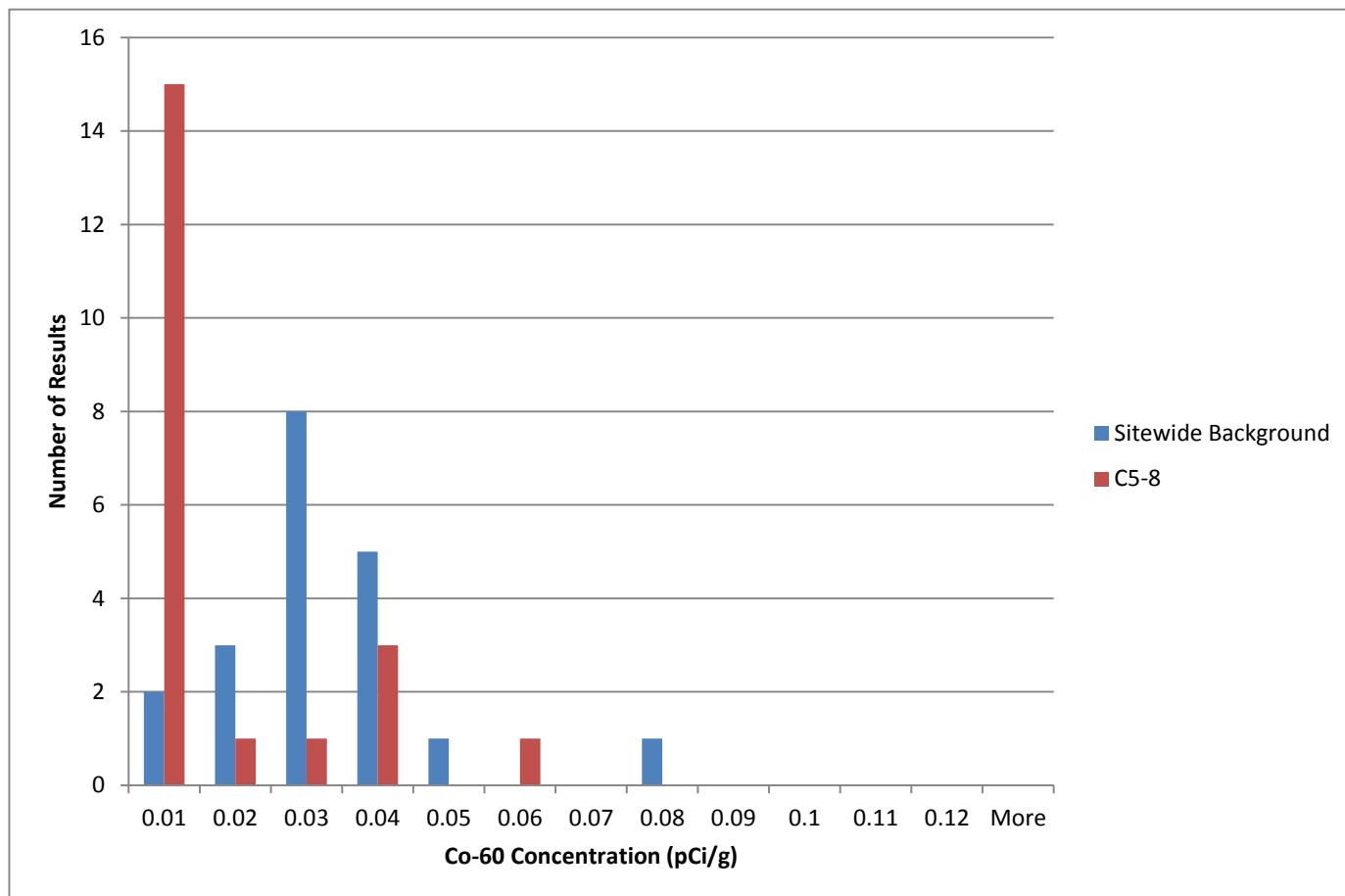
## Histogram, RSY C5 (Use 8) vs. Sitewide Background

## Background

<i>Bin</i>	<i>Frequency</i>
0.01	2
0.02	3
0.03	8
0.04	5
0.05	1
0.06	0
0.07	0
0.08	1
0.09	0
0.1	0
0.11	0
0.12	0
More	0

## C5-8

<i>Bin</i>	<i>Frequency</i>
0.01	15
0.02	1
0.03	1
0.04	3
0.05	0
0.06	1
0.07	0
0.08	0
0.09	0
0.1	0
0.11	0
0.12	0
More	0



# TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

## ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica St. Louis  
13715 Rider Trail North  
Earth City, MO 63045  
Tel: (314)298-8566

TestAmerica Job ID: 160-27302-2

Client Project/Site: Hunters Point Naval Shipyard - Parcel E2

For:

Aptim Federal Services LLC  
4005 Port Chicago Hwy, Suite 200  
Concord, California 94520

Attn: Eddie Kalombo

*micha korrinhizer*

Authorized for release by:

4/10/2018 12:25:12 PM

Micha Korrinhizer, Project Management Assistant II  
(314)298-8566

[micha.korrinhizer@testamericainc.com](mailto:micha.korrinhizer@testamericainc.com)

Designee for

Rhonda Ridenhower, Manager of Project Management  
(314)298-8566

[rhonda.ridenhower@testamericainc.com](mailto:rhonda.ridenhower@testamericainc.com)

### LINKS

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[www.testamericainc.com](http://www.testamericainc.com)

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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## Case Narrative

Client: Optim Federal Services LLC

Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-27302-2

**Job ID: 160-27302-2**

**Laboratory: TestAmerica St. Louis**

Narrative

### CASE NARRATIVE

**Client: Optim Federal Services LLC**

**Project: Hunters Point Naval Shipyard - Parcel E2**

**Report Number: 160-27302-2**

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

TestAmerica St. Louis attests to the validity of the laboratory data generated by TestAmerica facilities reported herein. All analyses performed by TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results for Chemistry analyses are reported on an "as received" basis unless otherwise indicated by the presence of a % solids value in the method header. All soil/sediment sample results for radiochemistry analyses are based upon sample as dried and disaggregated with the exception of tritium, carbon-14, and iodine-129 by gamma spectroscopy unless requested as wet weight by the client.

Any minimum detectable concentration (MDC), critical value (DLC), or Safe Drinking Water Act detection limit (SDWA DL) is sample-specific unless otherwise stated elsewhere in this narrative.

Reference the chain of custody and condition upon receipt report for any variations on receipt conditions and temperature of samples on receipt.

Manual Integrations were performed only when necessary and are in compliance with the laboratory's standard operating procedure. Detailed information can be found in the raw data section of the level IV report.

The following clean-up methods for Organic analyses may have been used on the samples in this data set. Specific methods employed are documented on the batch extraction logs:

Method 3600C: Cleanup

Method 3620C: Florisil Cleanup

Method 3630C: Silica Gel Cleanup

Method 3640A: Gel-Permeation Cleanup

Method 3650B: Acid-Base Partition Cleanup

Method 3660B: Sulfur Cleanup

Method 3665A: Sulfuric Acid/Permanganate Cleanup

## Case Narrative

Client: Aptim Federal Services LLC

Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-27302-2

### **Job ID: 160-27302-2 (Continued)**

#### **Laboratory: TestAmerica St. Louis (Continued)**

This laboratory report is confidential and is intended for the sole use of TestAmerica and its client.

#### **RECEIPT**

The samples were received on 03/14/2018; the samples arrived in good condition, properly preserved. The temperature of the coolers at receipt was 23.0° C.

#### **TOTAL BETA STRONTIUM (GFPC)**

Samples PE2-RSYC5-U8-S001 (160-27302-1) and PE2-RSYC5-U8-S011 (160-27302-11) were analyzed for Total Beta Strontium (GFPC) in accordance with EPA 905. The samples were dried on 03/14/2018, prepared on 03/19/2018 and analyzed on 04/05/2018.

The following samples in batch 160-356501 could not be thoroughly homogenized before sub-sampling was performed due to sample matrix: PE2-RSYC5-U8-S001 (160-27302-1) and PE2-RSYC5-U8-S011 (160-27302-11). The samples contain small rocks.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

#### **RADIUM-226 BY GAMMA SPEC (21 DAY INGROWTH)**

Samples PE2-RSYC5-U8-S001 (160-27302-1), PE2-RSYC5-U8-S002 (160-27302-2), PE2-RSYC5-U8-S003 (160-27302-3), PE2-RSYC5-U8-S004 (160-27302-4), PE2-RSYC5-U8-S005 (160-27302-5), PE2-RSYC5-U8-S006 (160-27302-6), PE2-RSYC5-U8-S007 (160-27302-7), PE2-RSYC5-U8-S008 (160-27302-8), PE2-RSYC5-U8-S009 (160-27302-9), PE2-RSYC5-U8-S010 (160-27302-10), PE2-RSYC5-U8-S011 (160-27302-11), PE2-RSYC5-U8-S012 (160-27302-12), PE2-RSYC5-U8-S013 (160-27302-13), PE2-RSYC5-U8-S014 (160-27302-14), PE2-RSYC5-U8-S015 (160-27302-15), PE2-RSYC5-U8-S016 (160-27302-16), PE2-RSYC5-U8-S017 (160-27302-17) and PE2-RSYC5-U8-S018 (160-27302-18) were analyzed for Radium-226 by gamma spec (21 day ingrowth) in accordance with EPA GA\_01\_R. The samples were dried on 03/14/2018, prepared on 03/19/2018 and analyzed on 04/09/2018.

The cesium-137 detection goal of 0.0700 pCi/g was not met for the following samples in batch 160-356453: PE2-RSYC5-U8-S003 (160-27302-3), PE2-RSYC5-U8-S011 (160-27302-11), PE2-RSYC5-U8-S013 (160-27302-13), PE2-RSYC5-U8-S014 (160-27302-14), PE2-RSYC5-U8-S015 (160-27302-15) and PE2-RSYC5-U8-S017 (160-27302-17). This is caused by the elevated Compton background due to the low level natural activity in the samples (i.e. potassium-40). The data have been reported

Sample PE2-RSYC5-U8-S003 (160-27302-3) in batch 160-356453 exhibited a negative result greater in magnitude than the 3 sigma TPU for PB-210. This occurrence was evaluated and determined to be random in nature. Sporadic occurrences such as this are statistically expected. No further action is required.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.



## CHAIN OF CUSTODY

Ref. Document # PE2\_RSYC5\_USE8\_TW-01\_SH-11#423

Page 2 of 2

Project Manager: <b>Nels Johnson</b>	
(Name & phone #)	
Send Report To:	Eddie Kalombo
Phone/Fax Number:	415-987-0760
Address: 4005 Port Chicago Hwy	
City: Concord, CA, 94520	
Sampler's Name(s): <i>Rick Geyer</i>	

Sample ID Number	Sample Description	Collection Information		Method	# Containers	Preservative (solid)	Preservative (water)	Container Type	N/A	N/A
		Date	Time							
PE2-RSYC5-U8-S011	Parcel E-2 RSYC5 USE 8 Systematic	3/10/18	13:52	G	SO 1	16 oz. plastic jar	X	X	X	5
PE2-RSYC5-U8-S012	Parcel E-2 RSYC5 USE 8 Systematic	3/10/18	13:54	G	SO 1	16 oz. plastic jar	X			5
PE2-RSYC5-U8-S013	Parcel E-2 RSYC5 USE 8 Systematic	3/10/18	13:57	G	SO 1	16 oz. plastic jar	X			5
PE2-RSYC5-U8-S014	Parcel E-2 RSYC5 USE 8 Systematic	3/10/18	14:00	G	SO 1	16 oz. plastic jar	X			5
PE2-RSYC5-U8-S015	Parcel E-2 RSYC5 USE 8 Systematic	3/10/18	14:02	G	SO 1	16 oz. plastic jar	X			5
PE2-RSYC5-U8-S016	Parcel E-2 RSYC5 USE 8 Systematic	3/10/18	14:05	G	SO 1	16 oz. plastic jar	X			5
PE2-RSYC5-U8-S017	Parcel E-2 RSYC5 USE 8 Systematic	3/10/18	14:07	G	SO 1	16 oz. plastic jar	X			5
PE2-RSYC5-U8-S018	Parcel E-2 RSYC5 USE 8 Systematic	3/10/18	14:10	G	SO 1	16 oz. plastic jar	X			5

### Special Instructions:

7 days ingrown draft and follow with 21 days final.

<input type="checkbox"/> 24-hr	<input type="checkbox"/> 3-day	<input type="checkbox"/> 10-day	Level Of QC Required:	Project Specific:	Method Codes	Method Codes	Method Codes	Method Codes
Reinquished By: <i>Rick Geyer</i>	Received By: <i>[Signature]</i>	Date: 3/10/18 Time: 14:24	I	Received By: <i>[Signature]</i>	Date: 3/12/18 Time: 16:30	III	Date: 3/12/18 Time: 16:30	Project Specific: <i>[Signature]</i>
Reinquished By: <i>[Signature]</i>	Received By: <i>[Signature]</i>	Date: 3/12/18 Time: 16:30	II	Received By: <i>[Signature]</i>	Date: 3/14/18 Time: 16:30	III	Date: 3/14/18 Time: 16:30	Method Codes: <i>[Signature]</i>
Reinquished By: <i>[Signature]</i>	Received By: <i>[Signature]</i>	Date: 3/13/18 Time: 09:00	III	Received By: <i>[Signature]</i>	Date: 3/14/18 Time: 09:00	IV	Date: 3/14/18 Time: 09:00	Matrix Codes: <i>[Signature]</i>
Reinquished By: <i>[Signature]</i>	Received By: <i>[Signature]</i>	Date: 3/14/18 Time: A	Air	Received By: <i>[Signature]</i>	Date: 3/14/18 Time: A	Air	Date: 3/14/18 Time: A	DW = Drinking Water GW = Ground Water WW = Waste Water G = Grab SO = Soil SL = Sludge CP = Chip Samples ABS = Asbestos, PO=Pipe Opening [Signature]

## Login Sample Receipt Checklist

Client: Aptim Federal Services LLC

Job Number: 160-27302-2

**Login Number: 27302****List Number: 1****Creator: Clarke, Jill C****List Source: TestAmerica St. Louis**

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

## Definitions/Glossary

Client: Aptim Federal Services LLC

Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-27302-2

### Qualifiers

#### Rad

Qualifier	Qualifier Description
U	Undetected at the Limit of Detection.

### Glossary

#### Abbreviation

**These commonly used abbreviations may or may not be present in this report.**

□	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

## Method Summary

Client: Aptim Federal Services LLC

Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-27302-2

Method	Method Description	Protocol	Laboratory
905.0	Total Beta Strontium (GFPC)	DOE	TAL SL
GA-01-R	Radium-226 & Other Gamma Emitters (GS)	DOE	TAL SL

**Protocol References:**

DOE = U.S. Department of Energy

**Laboratory References:**

TAL SL = TestAmerica St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

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## Sample Summary

Client: Aptim Federal Services LLC

Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-27302-2

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
160-27302-1	PE2-RSYC5-U8-S001	Solid	03/10/18 13:30	03/14/18 08:40
160-27302-2	PE2-RSYC5-U8-S002	Solid	03/10/18 13:32	03/14/18 08:40
160-27302-3	PE2-RSYC5-U8-S003	Solid	03/10/18 13:34	03/14/18 08:40
160-27302-4	PE2-RSYC5-U8-S004	Solid	03/10/18 13:37	03/14/18 08:40
160-27302-5	PE2-RSYC5-U8-S005	Solid	03/10/18 13:39	03/14/18 08:40
160-27302-6	PE2-RSYC5-U8-S006	Solid	03/10/18 13:41	03/14/18 08:40
160-27302-7	PE2-RSYC5-U8-S007	Solid	03/10/18 13:43	03/14/18 08:40
160-27302-8	PE2-RSYC5-U8-S008	Solid	03/10/18 13:45	03/14/18 08:40
160-27302-9	PE2-RSYC5-U8-S009	Solid	03/10/18 13:47	03/14/18 08:40
160-27302-10	PE2-RSYC5-U8-S010	Solid	03/10/18 13:50	03/14/18 08:40
160-27302-11	PE2-RSYC5-U8-S011	Solid	03/10/18 13:52	03/14/18 08:40
160-27302-12	PE2-RSYC5-U8-S012	Solid	03/10/18 13:54	03/14/18 08:40
160-27302-13	PE2-RSYC5-U8-S013	Solid	03/10/18 13:57	03/14/18 08:40
160-27302-14	PE2-RSYC5-U8-S014	Solid	03/10/18 14:00	03/14/18 08:40
160-27302-15	PE2-RSYC5-U8-S015	Solid	03/10/18 14:02	03/14/18 08:40
160-27302-16	PE2-RSYC5-U8-S016	Solid	03/10/18 14:05	03/14/18 08:40
160-27302-17	PE2-RSYC5-U8-S017	Solid	03/10/18 14:07	03/14/18 08:40
160-27302-18	PE2-RSYC5-U8-S018	Solid	03/10/18 14:10	03/14/18 08:40























# QC Sample Results

Client: Aptim Federal Services LLC

Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-27302-2

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Lab Sample ID: LCS 160-356453/2-A

Matrix: Solid

Analysis Batch: 359671

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 356453

Analyte	Spike Added	LCS		Uncert. (2σ+/-)	Total		%Rec	%Rec. Limits
		Result	Qual		LOQ	DLC		
Americium-241	96.8	91.06		9.55		0.488	pCi/g	94 87 - 116
Cesium-137	28.4	26.53		2.82	0.0700	0.0981	pCi/g	93 87 - 120
Cobalt-60	13.5	12.22		1.27	0.200	0.0416	pCi/g	91 87 - 115

Lab Sample ID: 160-27302-1 DU

Matrix: Solid

Analysis Batch: 359675

Client Sample ID: PE2-RSYC5-U8-S001

Prep Type: Total/NA

Prep Batch: 356453

Analyte	Sample Result	Sample Qual	DU Result	DU Qual	Uncert. (2σ+/-)	Total		RER	RER Limit
	Result	Qual				LOQ	DLC		
Actinium 228	0.714		0.6520		0.236		0.0801	pCi/g	0.14 1
Actinium-227	-0.160	U	0.005688	U	0.0174		0.629	pCi/g	0.20 1
Bismuth-212	0.335	U	0.3386	U	0.570		0.433	pCi/g	0 1
Bismuth-214	0.641		0.5779		0.144		0.0515	pCi/g	0.19 1
Cesium-137	-0.0213	U	0.01932	U	0.0684	0.0700	0.0550	pCi/g	0.30 1
Cobalt-60	0.00504	U	-0.06997	U	0.111	0.200	0.0533	pCi/g	0.52 1
Lead-210	0.844	U	1.303		0.915		0.638	pCi/g	0.20 1
Lead-212	0.619		0.6030		0.124		0.0412	pCi/g	0.06 1
Lead-214	0.741		0.6761		0.136		0.0452	pCi/g	0.22 1
Potassium-40	10.2		10.25		1.73		0.292	pCi/g	0 1
Protactinium-231	0.718	U	0.0000	U	0.744		2.19	pCi/g	0.25 1
Radium-226	0.641		0.5779		0.144	0.700	0.0515	pCi/g	0.19 1
Radium-228	0.714		0.6520		0.236		0.0801	pCi/g	0.14 1
Thallium-208	0.238		0.2266		0.0717		0.0253	pCi/g	0.08 1
Thorium-228	0.619		0.6030		0.124		0.0412	pCi/g	0.06 1
Thorium-232	0.714		0.6520		0.236		0.0801	pCi/g	0.14 1
Thorium-234	-0.861	U	0.3947	U	0.901		1.13	pCi/g	0.68 1
Uranium-235	-0.199	U	0.03605	U	0.0586		0.507	pCi/g	0.62 1
Uranium-238	-0.861	U	0.3947	U	0.901		1.13	pCi/g	0.68 1

# QC Association Summary

Client: Aptim Federal Services LLC

Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-27302-2

**Rad****Leach Batch: 355635**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-27302-1	PE2-RSYC5-U8-S001	Total/NA	Solid	Dry and Grind	
160-27302-2	PE2-RSYC5-U8-S002	Total/NA	Solid	Dry and Grind	
160-27302-3	PE2-RSYC5-U8-S003	Total/NA	Solid	Dry and Grind	
160-27302-4	PE2-RSYC5-U8-S004	Total/NA	Solid	Dry and Grind	
160-27302-5	PE2-RSYC5-U8-S005	Total/NA	Solid	Dry and Grind	
160-27302-6	PE2-RSYC5-U8-S006	Total/NA	Solid	Dry and Grind	
160-27302-7	PE2-RSYC5-U8-S007	Total/NA	Solid	Dry and Grind	
160-27302-8	PE2-RSYC5-U8-S008	Total/NA	Solid	Dry and Grind	
160-27302-9	PE2-RSYC5-U8-S009	Total/NA	Solid	Dry and Grind	
160-27302-10	PE2-RSYC5-U8-S010	Total/NA	Solid	Dry and Grind	
160-27302-11	PE2-RSYC5-U8-S011	Total/NA	Solid	Dry and Grind	
160-27302-12	PE2-RSYC5-U8-S012	Total/NA	Solid	Dry and Grind	
160-27302-13	PE2-RSYC5-U8-S013	Total/NA	Solid	Dry and Grind	
160-27302-14	PE2-RSYC5-U8-S014	Total/NA	Solid	Dry and Grind	
160-27302-15	PE2-RSYC5-U8-S015	Total/NA	Solid	Dry and Grind	
160-27302-16	PE2-RSYC5-U8-S016	Total/NA	Solid	Dry and Grind	
160-27302-17	PE2-RSYC5-U8-S017	Total/NA	Solid	Dry and Grind	
160-27302-18	PE2-RSYC5-U8-S018	Total/NA	Solid	Dry and Grind	
160-27302-1 DU	PE2-RSYC5-U8-S001	Total/NA	Solid	Dry and Grind	

**Prep Batch: 356453**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-27302-1	PE2-RSYC5-U8-S001	Total/NA	Solid	Fill_Geo-21	355635
160-27302-2	PE2-RSYC5-U8-S002	Total/NA	Solid	Fill_Geo-21	355635
160-27302-3	PE2-RSYC5-U8-S003	Total/NA	Solid	Fill_Geo-21	355635
160-27302-4	PE2-RSYC5-U8-S004	Total/NA	Solid	Fill_Geo-21	355635
160-27302-5	PE2-RSYC5-U8-S005	Total/NA	Solid	Fill_Geo-21	355635
160-27302-6	PE2-RSYC5-U8-S006	Total/NA	Solid	Fill_Geo-21	355635
160-27302-7	PE2-RSYC5-U8-S007	Total/NA	Solid	Fill_Geo-21	355635
160-27302-8	PE2-RSYC5-U8-S008	Total/NA	Solid	Fill_Geo-21	355635
160-27302-9	PE2-RSYC5-U8-S009	Total/NA	Solid	Fill_Geo-21	355635
160-27302-10	PE2-RSYC5-U8-S010	Total/NA	Solid	Fill_Geo-21	355635
160-27302-11	PE2-RSYC5-U8-S011	Total/NA	Solid	Fill_Geo-21	355635
160-27302-12	PE2-RSYC5-U8-S012	Total/NA	Solid	Fill_Geo-21	355635
160-27302-13	PE2-RSYC5-U8-S013	Total/NA	Solid	Fill_Geo-21	355635
160-27302-14	PE2-RSYC5-U8-S014	Total/NA	Solid	Fill_Geo-21	355635
160-27302-15	PE2-RSYC5-U8-S015	Total/NA	Solid	Fill_Geo-21	355635
160-27302-16	PE2-RSYC5-U8-S016	Total/NA	Solid	Fill_Geo-21	355635
160-27302-17	PE2-RSYC5-U8-S017	Total/NA	Solid	Fill_Geo-21	355635
160-27302-18	PE2-RSYC5-U8-S018	Total/NA	Solid	Fill_Geo-21	355635
MB 160-356453/1-A	Method Blank	Total/NA	Solid	Fill_Geo-21	
LCS 160-356453/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	
160-27302-1 DU	PE2-RSYC5-U8-S001	Total/NA	Solid	Fill_Geo-21	355635

**Prep Batch: 356501**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-27302-1	PE2-RSYC5-U8-S001	Total/NA	Solid	DPS-0	355635
160-27302-11	PE2-RSYC5-U8-S011	Total/NA	Solid	DPS-0	355635
MB 160-356501/2-A	Method Blank	Total/NA	Solid	DPS-0	
LCS 160-356501/1-A	Lab Control Sample	Total/NA	Solid	DPS-0	

# Tracer/Carrier Summary

Client: Aptim Federal Services LLC

Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-27302-2

**Method: 905.0 - Total Beta Strontium (GFPC)****Matrix: Solid****Prep Type: Total/NA****Percent Yield (Acceptance Limits)**

<b>Lab Sample ID</b>	<b>Client Sample ID</b>	<b>Sr Carrier (40-110)</b>										
160-27302-1	PE2-RSYC5-U8-S001	85.3										
160-27302-11	PE2-RSYC5-U8-S011	87.1										
LCS 160-356501/1-A	Lab Control Sample	77.7										
MB 160-356501/23-A	Method Blank	81.0										

**Tracer/Carrier Legend**

Sr Carrier = Sr Carrier

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## ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica St. Louis  
13715 Rider Trail North  
Earth City, MO 63045  
Tel: (314)298-8566

TestAmerica Job ID: 160-28905-2

Client Project/Site: Hunters Point Naval Shipyard - Parcel E2

For:

Aptim Federal Services LLC  
4005 Port Chicago Hwy, Suite 200  
Concord, California 94520

Attn: Eddie Kalombo

*Rhonda Ridenhower*

Authorized for release by:

7/10/2018 10:03:58 PM

Rhonda Ridenhower, Manager of Project Management  
(314)298-8566

[rhonda.ridenhower@testamericainc.com](mailto:rhonda.ridenhower@testamericainc.com)

### LINKS

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This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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## Case Narrative

Client: Aptim Federal Services LLC

Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-28905-2

**Job ID: 160-28905-2**

**Laboratory: TestAmerica St. Louis**

**Narrative**

### CASE NARRATIVE

**Client: Aptim Federal Services LLC**

**Project: Hunters Point Naval Shipyard - Parcel E2**

**Report Number: 160-28905-2**

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

TestAmerica St. Louis attests to the validity of the laboratory data generated by TestAmerica facilities reported herein. All analyses performed by TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results for Chemistry analyses are reported on an "as received" basis unless otherwise indicated by the presence of a % solids value in the method header. All soil/sediment sample results for radiochemistry analyses are based upon sample as dried and disaggregated with the exception of tritium, carbon-14, and iodine-129 by gamma spectroscopy unless requested as wet weight by the client."

Any minimum detectable concentration (MDC), critical value (DLC), or Safe Drinking Water Act detection limit (SDWA DL) is sample-specific unless otherwise stated elsewhere in this narrative.

Reference the chain of custody and condition upon receipt report for any variations on receipt conditions and temperature of samples on receipt.

Manual Integrations were performed only when necessary and are in compliance with the laboratory's standard operating procedure. Detailed information can be found in the raw data section of the level IV report.

The following clean-up methods for Organic analyses may have been used on the samples in this data set. Specific methods employed are documented on the batch extraction logs:

Method 3600C: Cleanup

Method 3620C: Florisil Cleanup

Method 3630C: Silica Gel Cleanup

Method 3640A: Gel-Permeation Cleanup

Method 3650B: Acid-Base Partition Cleanup

Method 3660B: Sulfur Cleanup

## Case Narrative

Client: Aptim Federal Services LLC

Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-28905-2

### **Job ID: 160-28905-2 (Continued)**

#### **Laboratory: TestAmerica St. Louis (Continued)**

Method 3665A: Sulfuric Acid/Permanganate Cleanup

This laboratory report is confidential and is intended for the sole use of TestAmerica and its client.

#### **RECEIPT**

The samples were received on 06/12/2018; the samples arrived in good condition, properly preserved. The temperature of the coolers at receipt was 18.0 C.

#### **RADIUM-226 BY GAMMA SPEC (21 DAY INGROWTH)**

Samples PE2-RSYC5-U8-B-S011-BOUNDING-01 (160-28905-1), PE2-RSYC5-U8-B-S011-BOUNDING-02 (160-28905-2), PE2-RSYC5-U8-B-S011-BOUNDING-03 (160-28905-3) and PE2-RSYC5-U8-B-S011-BOUNDING-04 (160-28905-4) were analyzed for Radium-226 by gamma spec (21 day ingrowth) in accordance with EPA GA\_01\_R. The samples were dried on 06/13/2018, prepared on 06/18/2018 and analyzed on 07/09/2018.

The cesium-137 detection goal of 0.0700 pCi/g was not met. This is caused by statistical fluctuations in the Compton background due to low level activity in the samples in conjunction with the software attempting to fit a peak into the noise of this baseline.

PE2-RSYC5-U8-B-S011-BOUNDING-03 (160-28905-3)

The cesium-137 detection goal of 0.0700 pCi/g was not met. This is caused by statistical fluctuations in the Compton background due to low level activity in the samples in conjunction with the software attempting to fit a peak into the noise of this baseline.

PE2-RSYC5-U8-B-S011-BOUNDING-01 (160-28905-1) and (160-28905-A-1-E DU)

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.



## Login Sample Receipt Checklist

Client: Aptim Federal Services LLC

Job Number: 160-28905-2

**Login Number: 28905****List Number: 1****Creator: Taylor, Kristene N****List Source: TestAmerica St. Louis**

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

## Definitions/Glossary

Client: Aptim Federal Services LLC

Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-28905-2

### Qualifiers

#### Rad

Qualifier	Qualifier Description
U	Undetected at the Limit of Detection.

### Glossary

#### Abbreviation

**These commonly used abbreviations may or may not be present in this report.**

□	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

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## Method Summary

Client: Aptim Federal Services LLC

Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-28905-2

Method	Method Description	Protocol	Laboratory
GA-01-R	Radium-226 & Other Gamma Emitters (GS)	DOE	TAL SL
Dry and Grind	Preparation, Dry and Grind	None	TAL SL
Fill_Geo-21	Fill Geometry, 21-Day In-Growth	None	TAL SL

**Protocol References:**

DOE = U.S. Department of Energy

None = None

**Laboratory References:**

TAL SL = TestAmerica St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

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## Sample Summary

Client: Aptim Federal Services LLC

Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-28905-2

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
160-28905-1	PE2-RSYC5-U8-B-S011-BOUNDING-01	Solid	06/08/18 12:08	06/12/18 08:45
160-28905-2	PE2-RSYC5-U8-B-S011-BOUNDING-02	Solid	06/08/18 12:11	06/12/18 08:45
160-28905-3	PE2-RSYC5-U8-B-S011-BOUNDING-03	Solid	06/08/18 12:14	06/12/18 08:45
160-28905-4	PE2-RSYC5-U8-B-S011-BOUNDING-04	Solid	06/08/18 12:17	06/12/18 08:45

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# QC Association Summary

Client: Aptim Federal Services LLC

Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-28905-2

## Rad

### Leach Batch: 370302

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-28905-1	PE2-RSYC5-U8-B-S011-BOUNDING-01	Total/NA	Solid	Dry and Grind	
160-28905-2	PE2-RSYC5-U8-B-S011-BOUNDING-02	Total/NA	Solid	Dry and Grind	
160-28905-3	PE2-RSYC5-U8-B-S011-BOUNDING-03	Total/NA	Solid	Dry and Grind	
160-28905-4	PE2-RSYC5-U8-B-S011-BOUNDING-04	Total/NA	Solid	Dry and Grind	
160-28905-1 DU	PE2-RSYC5-U8-B-S011-BOUNDING-01	Total/NA	Solid	Dry and Grind	

### Prep Batch: 370837

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-28905-3	PE2-RSYC5-U8-B-S011-BOUNDING-03	Total/NA	Solid	Fill_Geo-21	370302
160-28905-4	PE2-RSYC5-U8-B-S011-BOUNDING-04	Total/NA	Solid	Fill_Geo-21	370302
MB 160-370837/1-A	Method Blank	Total/NA	Solid	Fill_Geo-21	
LCS 160-370837/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	

### Prep Batch: 370839

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-28905-1	PE2-RSYC5-U8-B-S011-BOUNDING-01	Total/NA	Solid	Fill_Geo-21	370302
160-28905-2	PE2-RSYC5-U8-B-S011-BOUNDING-02	Total/NA	Solid	Fill_Geo-21	370302
MB 160-370839/1-A	Method Blank	Total/NA	Solid	Fill_Geo-21	
LCS 160-370839/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	
160-28905-1 DU	PE2-RSYC5-U8-B-S011-BOUNDING-01	Total/NA	Solid	Fill_Geo-21	370302